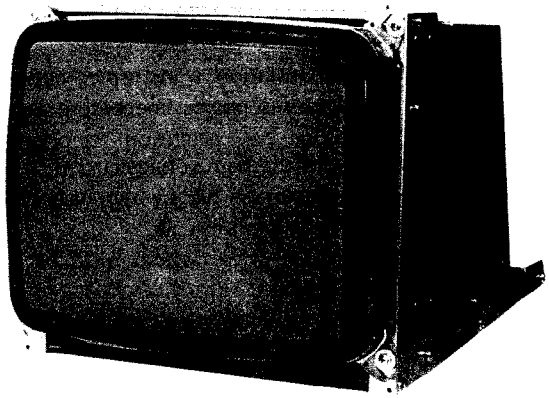
CODE NO.FTD82080233

Service Manual

Color CRT Data Display

MODEL TX-1404FH

Chassis No. X06



CONTENTS

Panasonic®
Matsushita Electric

1. SAFETY PRECAUTIONS

1-1 CAUTION:

No modification of any circuit should be attempted. Service work should only be performed after you are thoroughly familiar with all of the following safety checks and servicing guide lines.

1-2 SAFETY CHECK

Care should be taken while servicing this CRT display because of the high voltage used in the deflection circuits. These voltages are exposed in such areas as the associated flyback and yoke circuits.

1-3 FIRE & SHOCK HAZARD

1-3-1 Insert an isolation transformer between the CRT display and AC power line before servicing chassis.

1-3-2 In servicing pay attention to original lead dress especially in the high voltage circuit. If a short circuit is found, replace all parts which have been overheated as a result the short circuit.

1-3-3 All the protective devices must be reinstalled per original design.

1-3-4 Soldering must be inspected possible for cold solder joints, frayed leads, damaged insulation, solder splashes or sharp solder points. Be certain to remove all foreign material.

1-4 IMPLOSION PROTECTION

All Panasonic picture tubes are equipped with an integral implosion protection system, but care should be taken to avoid damage and scratching during installation. Use only Panasonic replacement picture tubes.

1-5 X-RADIATION

WARNING: The only potential source of X-Radiation is the picture tube. However when the high voltage circuitry is operating properly there is no possibility of X-Radiation problem. The basic precaution which must be exercised is to keep the high voltage at the following factory-recommended level.

Note: It is important to use an accurate periodically calibrated high voltage meter.

1-5-1 To mearsure the high voltage, use a high impedance high voltage meter, Connect(−) to chassis and (+) to the CRT anode button.

1-5-2 Turn the Brightness control fully counterclockwise.

1-5-3 Measure the high Voltage. The high voltage meter should indicate at the following factory-recommended level.

1-5-4 If the upper meter indication exceeds the maximum level, immediate service is required to prevent the possibility of premature component failure.

1-5-5 To prevent X-Radiation possibility, it is essential to use the specified picture tube.

1-5-6 The nominal high voltage is 24.5KV and must not exceed 25KV at zero beam current at rated voltage.

IMPORTANT SAFETY NOTICE

There are special components used in Panasonic CRT displays which are important for safety. These parts are shaded on the schematic diagram and on the replacement parts list. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent X-RADIATION, shock, fire or other hazards. Do not modify the original design without written permission of the Panasonic company or this will void the original parts and labor guarantee.

GENERAL INFORMATION

Here is an outline of Model TX-1404FH.
This model is COLOR CRT DATA DISPLAY of metal frame type.

TX-1404FH uses High Resolution (Dot pitch 0.31mm) color Cathode Ray Tube.

Input signal is separate type and each input signal is put through 20 pin Connector on the P.C. Board.

Input signal is for TTL level,and H. drive pulse is capable of correspouding to 11.29μS.

In order to meet users' requirements, frame mechanism is employed for easy adjustment of CRT setting angle.
Angle can be changed by stages such as 0°, 2.5°, 7.5° and 10°
Switching requrator Circuit is Applied to for power supply of this model. and it is available for AC input 90~140V / 180~264V by changeing the select switch (115V / 220V) which builted-in the Switching Regurator.

COLOR DISPLAY SPECIFICATIONS

1. MECHANICAL DESCRIPTION

Dimension:

Height:	11.30" (287mm)max.
Width:	13.62" (346mm)max.
Depth:	14.57" (370mm) max.
Weight:	26.4 lbs(12kg)
Picture Tube:	370KAB22TC01
	Size 14"
	Gun In-Line
	Def, Angle 90°
	Neck dia 1.146" (29.1mm)
	Phosphor R. G. B
Tilt:	10°

2. ENVIRONMENT

Ambient temp, Humidity and Altitude:

Operating:

Temp:	32°F~122°F (0°~50°C)
Humidity:	5~90%
Altitude:	10,000 FT max. (3,000m)

Non-operating:

Temp:	-40°F~149°F (-40~65°C)
Humidity:	5~90%
Altitude:	40,000 FT max. (12,000m)

Storage and Shipment:

Temp:	-40°F~149°F (-40~65°C)
Humidity:	5~90%
Altitude:	40,000 FT max. (12,000m)

Vibration and Shock: (Packaged condition)

Vibration:
meet the following:

Frequency:	5~55 Hz
Vertical:	1.25 G
Horizontal:	0.75 G

Shock:

Coner and edge:	Height 15.8" (40cm)
Front, Back, Side, Bottom:	Height 19.7" (50cm)

3. ELECTRIC PERFORMANCE

Power supply:

Input Voltage:	AC90~140 / 180~264V
Input Frequency:	50 / 60Hz
Input Current:	1.3 A max.
Power:	70W max.
Inrush Current:	45 A op max. (at 100V AC)

Input Signals:

Horizontal Sync:

Polarity:	Negative
Signal Level:	4Vpp ± 1V
Input Imp:	≧1.5K ohmS

Vertical Sync:

Porarity:	Negative
Signal Level:	4Vpp ± 1V
Input Imp:	≧1.5K ohmS

Video Signal (R.G.B)

Polarity:	Positive
Signal Level:	4Vpp (See Note 1)
Tr. Tf:	≦5nS

Note 1. Max rise and fall times (from 10% to 90%) of input signals are less than 5 NS.

Image test Condition:

Charactor:	"H"
Color:	Green
Brightness:	Max.(without Back Raster)
View Direction:	Parallel to the CRT axis
Ambient Temperature:	Room Temp
Supply Voltage:	AC 115V

Note 2. To measure more then 20 minutes after power on.

Note 3. Normal Condition is the Condition that Satisfies Image test Condition. (Condition of following each items is normal condition, it not mentioned).

Video Out:

Turn Rise Time (Tr): Less then 20nS

Turn Fall Time (Tf): Less then 30nS

(To measure by 10MHz square-wave Duty 50%).

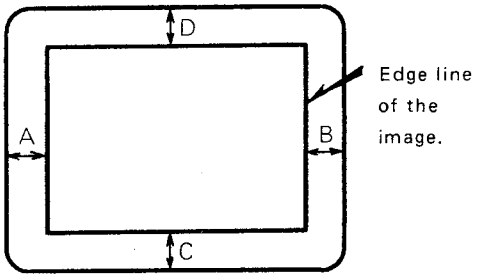
Image:

Charactet Area:

Horizontal:	**9.45 ± 0.2" (240 ± 5mm)**
Vertical:	**7.09 ± 0.2" (180 ± 5mm)**

IMAGE POSITION:

To be able to adjust at the center of the CRT. Image is within the area in Fig.

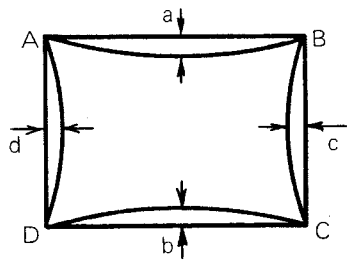


A–B ≦0.236" (6mm)
C–D ≦0.236" (6mm)
Normal Condition

DISTORTION:

(A) PINCUSHION

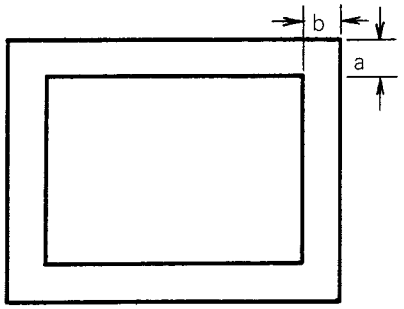
Upper: (a): Less than 0.098" (2.5mm)
Lower: (b): Less than 0.098" (2.5mm)
Right and Left (c), (d):
Less than 0.098" (2.5mm)



Input signal.....Cross-hatch

(B) RECTANGULARENESS & PARALLELOGRAM DISTORTION

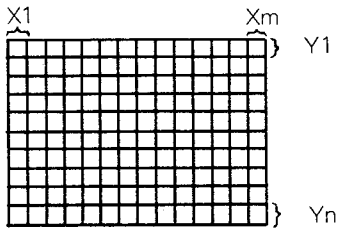
Edge of the image is within the area indicated by the dotted line in Fig.



a.....0.157" (4mm)
b.....0.157" (4mm)
Input signal.....Cross-hatch

(C) LINEARITY

Horizontal and vertical linearity shall be less than 7% see Fig.



Horizontal linearity

$$\frac{X\ max - X\ min}{X\ max + X\ min} \times 100(\%) \leqq 7\%$$

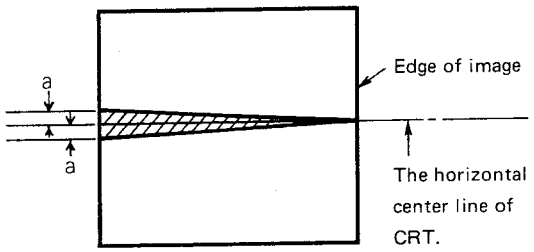
Vertical linearity

$$\frac{Y\ max - Y\ min}{Y\ max + Y\ min} \times 100(\%) \leqq 7\%$$

Note: Maximum and minimum value should not be adjacent to each other.
X max is maximum value among X1~Xm.
X min is minimum value among X1~Xm.
Y max is maximum value among Y1~Yn.
Y min is minimum value among Y1~Yn.
Input signal.....Cross hat, Green.

(D) ROTATION

Horizontal center line of the image shall be within the shaded area in Fig.



a.....0.098" (2.5mm)
Input signal.....Cross-hatch, Green.

Note: Should be measured under the following terrestriai magnetic field.
1). Without horizontal magnetic field.
2). With vertical manetic field.

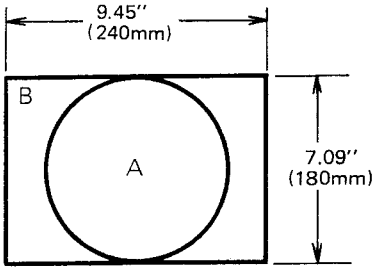
IMAGE SIZE VARIATION:

	Image size variation from the normal image size.	Range of Variation
By Brightness	Within 0.157"(4mm) (Horizontal and Vertical)	Max. to Min.
By Power Supply Voltage	Within ±0.118"(3mm) (Horizontal and Vertical)	AC 90~140V AC 180~264V
By temperature	Within ±0.157"(4mm) (Horizontal and Vertical)	25 ±25° C

Normal condition, if not mensioned.

OVERALL PERFORMANCE:

MIS-CONVERGENCE



Center of the display area
(A) ≦ 0.0236" (0.6mm)
Peripheral display area
(B) ≦ 0.0315" (0.8mm)

Note: Should be measured under the following conditions.
*With out horizontal magnetic field.(terrestrial).
*with vertical magnetic field.
*At room temperature.
*Input signal : Cross-hatch, R.G.B. mixed color.

HORIZONTAL RESOLUTION:

Horizontal	800pixels
Vertical	690pixels

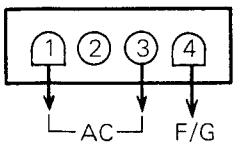
RESISTER BETWEEN FG AND SG:
15Kohms ±10%

INSULATION:
More than 100Mohms
(Between AC line and Chassis)

JITTER: Less than I dot.
(Invisible at a distance of 17.7" (45cm) from CRT surface.)

CONNECTOR AND WIRING

POWER SUPPLY:

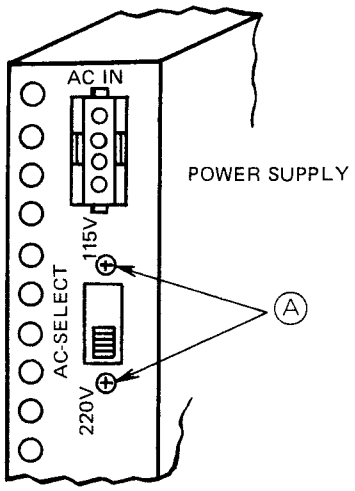


① ③ Power input
AC90~140/180~264V
50Hz/60Hz

④ Frame ground

When factory shipping, the power select Switch of the monitor power supply is set at 220V Side (AC input 180~264V).

There fore when use this unit in the 90~140V area, loose the 2(two) screws Ⓐ as shown fignre before power on then change the switch at 115V Side.

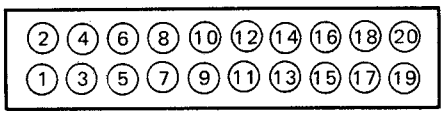


CONNECTOR TYPE:

MFR.....AMP Lock Connector

Display Side	Customer Side
4-Cap-housing (350780-1) Pin Contact (350561-1)	Connector (350779-1) Contact (350570-1)

SIGNAL INPUT:



Pin No.	Name	Pin No.	Name
1	Vertical Sync(V.S)	2	V.RTN (SG)
3		4	
5	Horizontal Sync(H.S)	6	H.RTN (SG)
7	Sound (Option)	8	SG
9		10	SG
11		12	SG
13		14	SG
15	Video (R)	16	R.RTN (SG)
17	Video (G)	18	G.RTN (SG)
19	Video (B)	20	B.RTN (SG)

CONNECTOR TYPE:

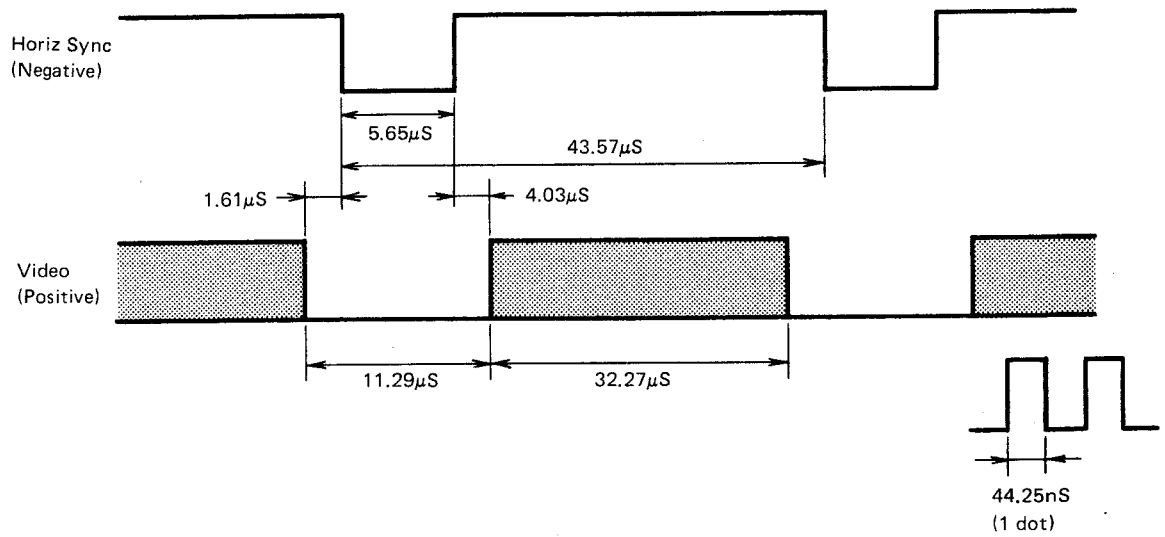
Display Side
MFR...Hirose Electric Co.,Ltd.
20P Connector
(HIF3-20P-254DS)

Custmer Side
MFR...Hirose Electric Co.,Ltd.
20P Connector
(HIF3N-20P-254R)

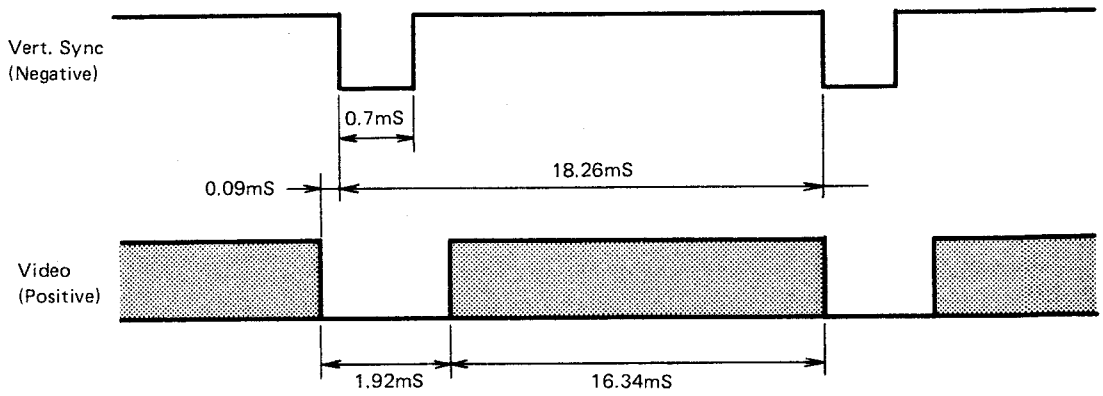
Note: The connectors of customer side are for your reference.

TIMING CHART

HORIZONTAL SYNC:



VERTICAL SYNC:



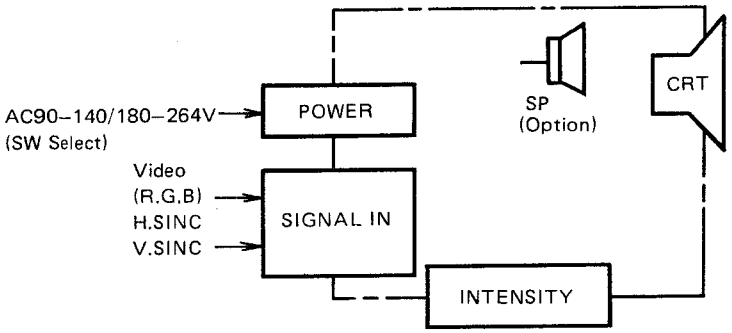
Note: Signal input level: TTL level
Time Tolerance: ±0.1%
Unit is adjusted according to this timing and frequency.

CONSTRUCTION AND BLOCK DIAGRAM

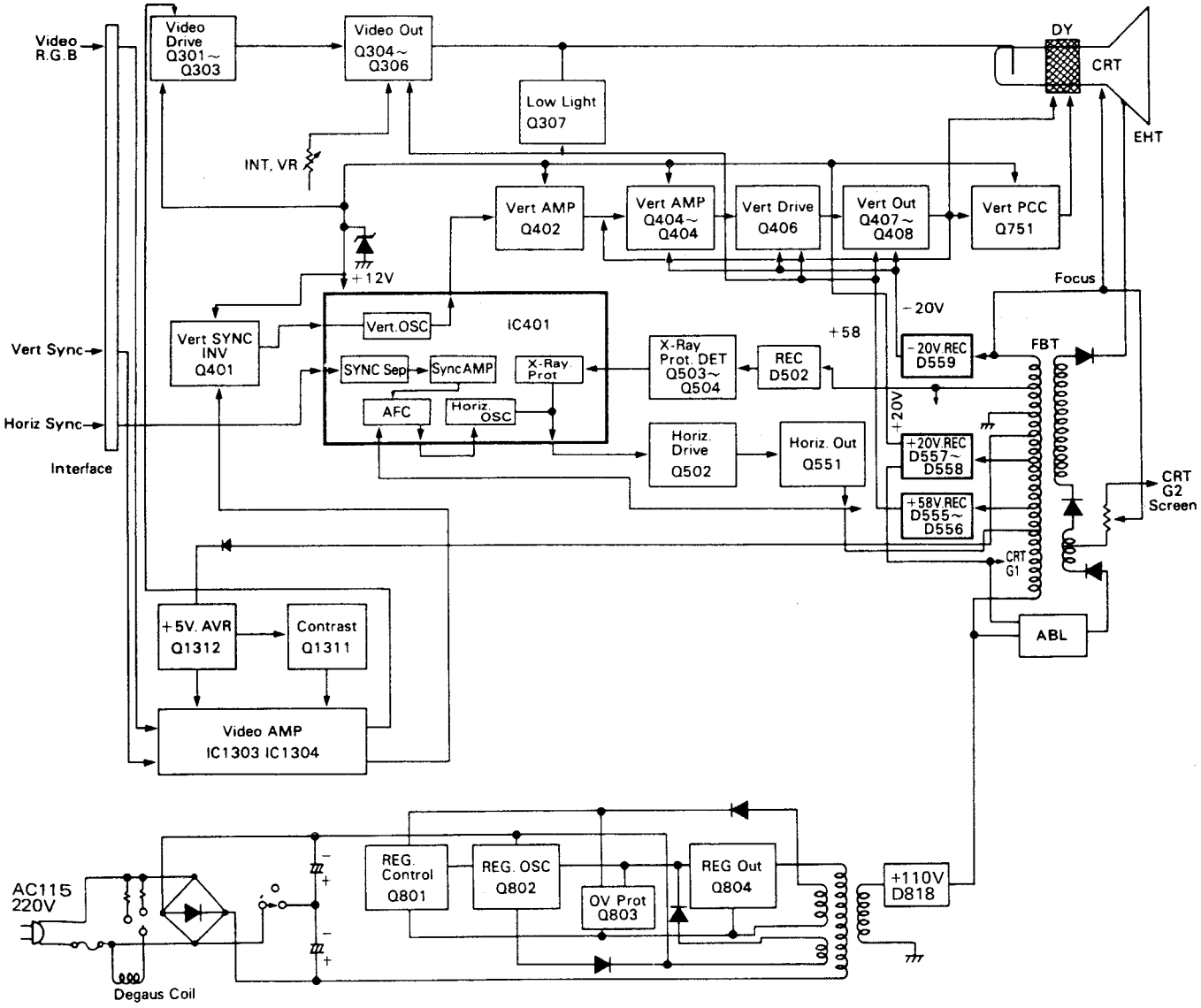
CONSTRUCTION OUTLINE

Note 1: CRT's Conducting Film is Connected to SG. (Signal Ground)

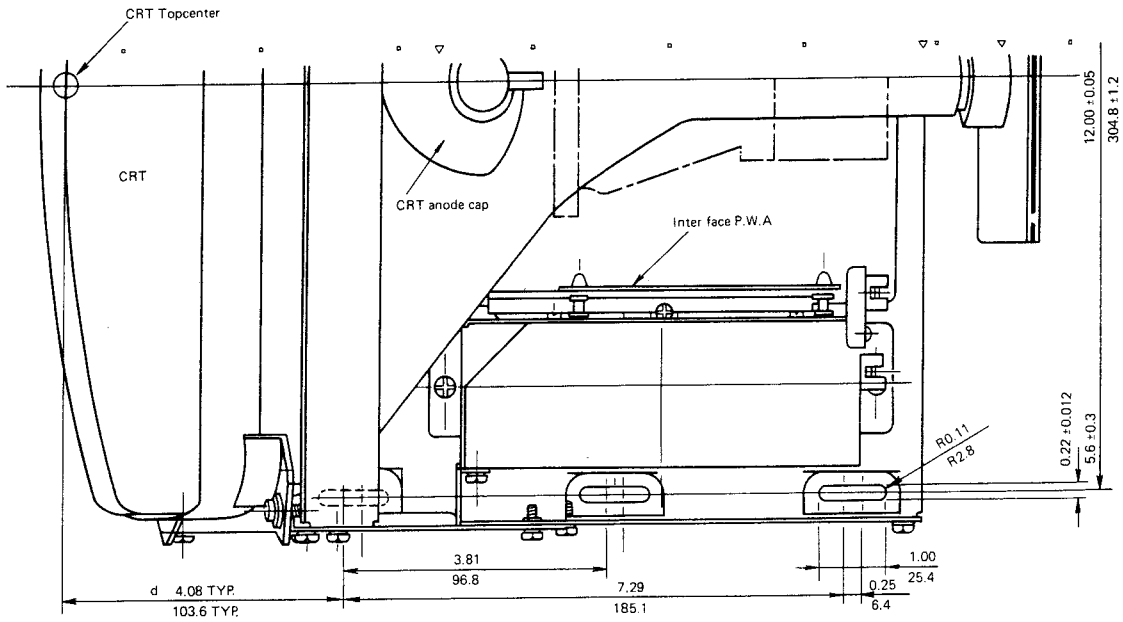
Note 2: SG and FG (Frame Ground) are separated by 15Kohm resister.



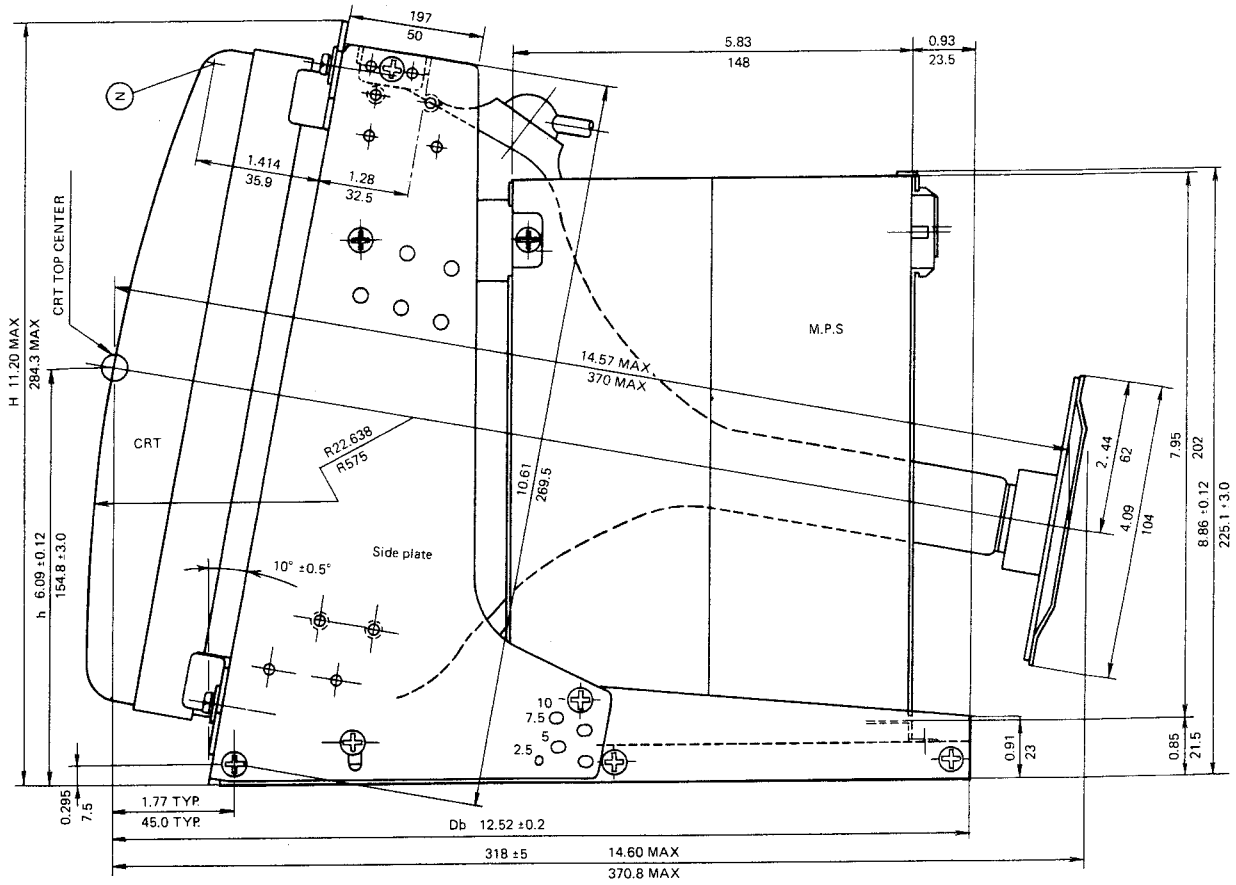
BLOCK DIAGRAM



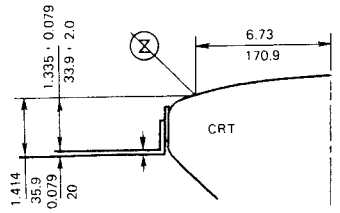
DIMENSION

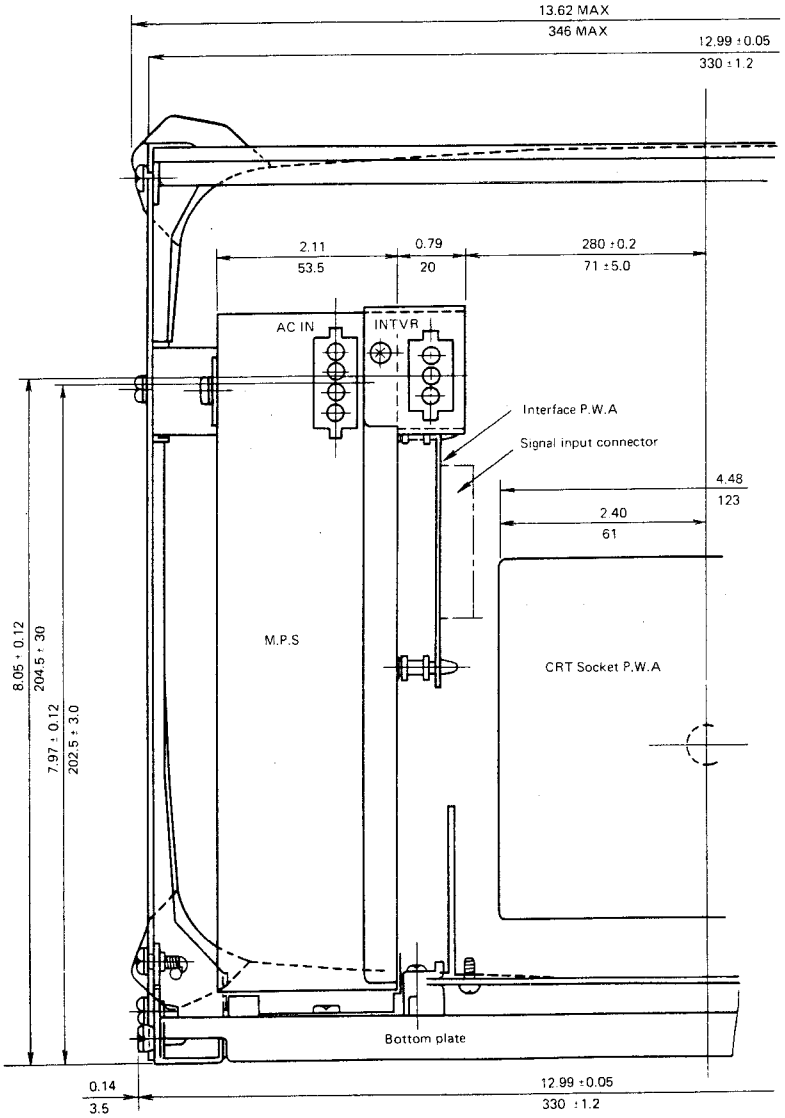


Dimension:
Upper Side: inch
Bottom Side: mm

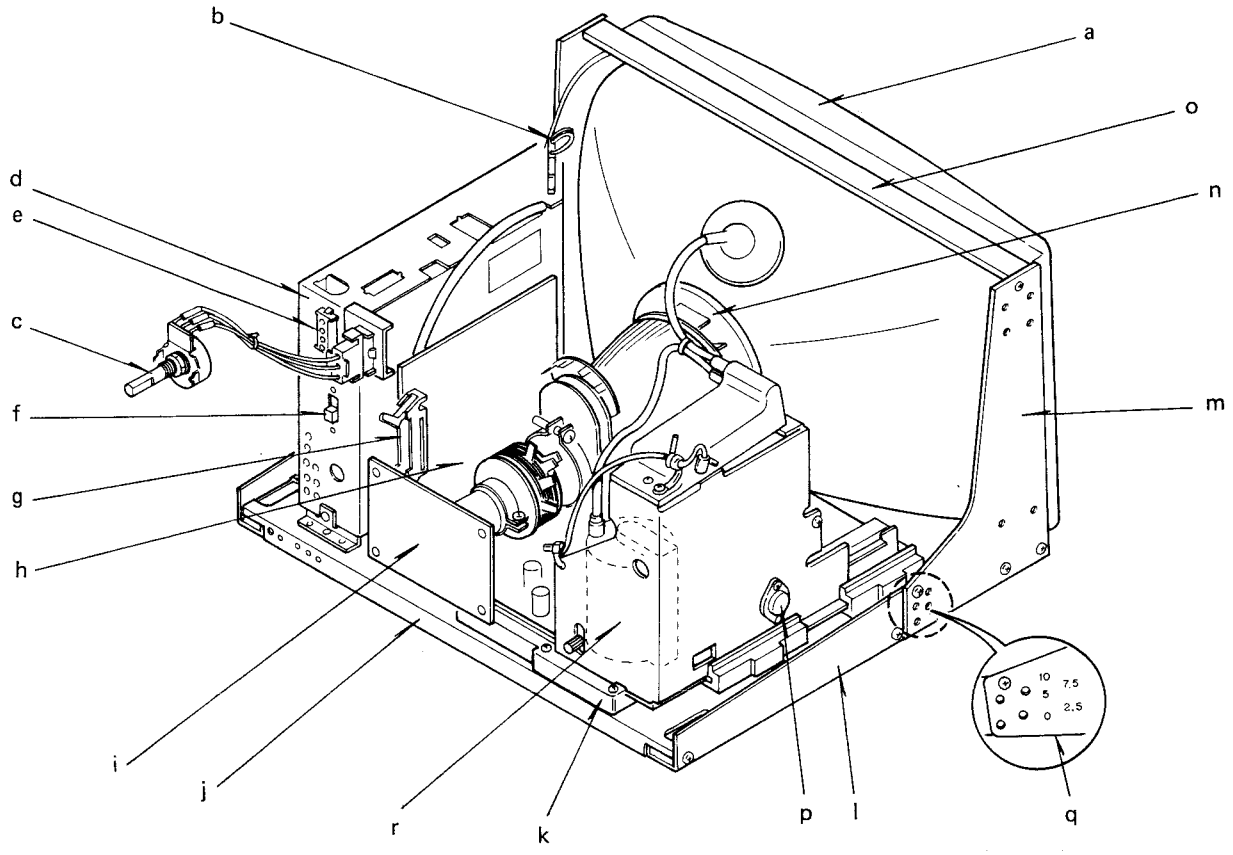


CRT TILT	H MAX (inch)	(mm)	h ± 0.12 / ± 30		d TYP.		Db ± 0.2 / ± 5.0			
0°	11.30	287.0	5.70	144.8	5.06	128.5	13.50	342.9		
2.5°	11.30	286.9	5.81	147.7	4.82	122.4	13.26	336.8		
5°	11.29	286.7	5.92	150.4	4.58	116.3	13.02	330.7		
7.5°	11.25	285.7	6.01	152.7	4.33	110.0	12.77	324.4		
10°	11.20	284.3	6.09	154.8	4.08	103.6	12.52	318.0		





COMPONENT LOCATION

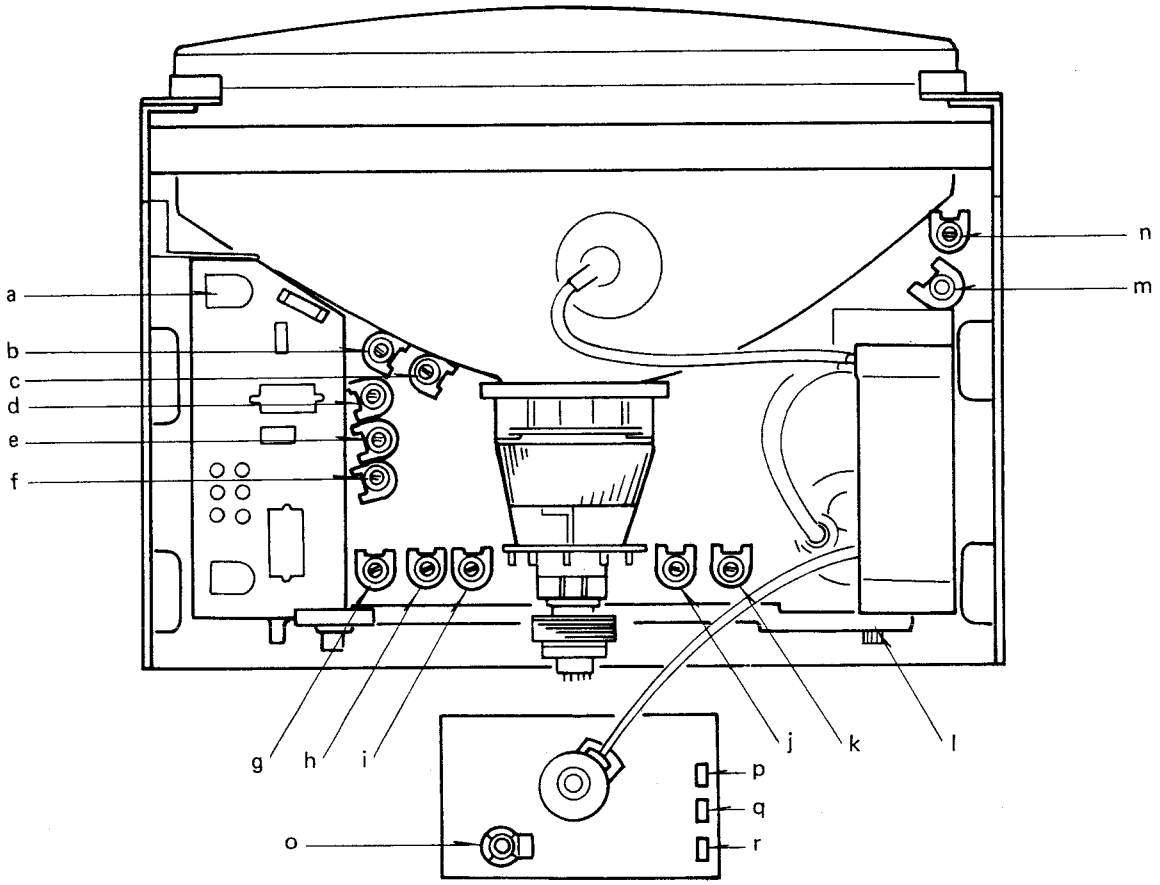


a.....CRT
b.....Degaus Coil Cnnector
c.....Intensity VR
d.....Power Supply
e.....Power input Connector
f.....Power Select Switch
g.....Signal Input Connector

h.....Interface Board
i.....CRT Socket Board
j.....Bottom Plate
k.....P.W.A Holder
l.....Mounting Metal
m....Side Plate
(Right and Left)

n.....Deflection Yoke
o.....TOP. Angel
p.....H. OUT. TR (Q551)
q.....CRT Tilt Chang Posi
r.....FBT

CONTROL DESCRIPTION



a.....B-ADJ (VR81)
b.....V.PCC (R754)
c.....V.Lin (R424)
d.....R.GAIN (R301)
e.....G.GAIN (R311)
f.....B.GAIN (R321)
g.....V.POSI (R420)
h.....V.SIZE (R426)
i..... V.HOLD (R407)
J.....H.HOLD (R516)
k.....H.PHASE(R540)
l..... FOCUS
m... H.WIDTH (L555)
n.....SUB BRIGHT (R554)
o.....SCREEN (R372)
p.....LOWLIGHT R (R338)
q..... LOWLIGHT B (R358)
r.....LOWLIGHT G (R348)

CAUTION TO ADJUSTMENT AND REPAIR

1. Degaussing is inevifably required at purity adjustment or convergence adjustment.

2. At the factory, white balance meter is used but we descriped the data in simple way.

3. If you check or adjust electrical specification or function, more than 20 minutes burn-in is required.

4. Reforming of the leadwire is required after your repair work.

CAUTION FOR SERVICING

In case of servicing or replacing CRT, high Voltage sometimes remains in the anode of CRT, So, completely discharge high voltage before servicing or replacing CRT so as to prevert a shock to the serviceman.

In this case, dischage to the external conductive coating (aquadac) of CRT.

Factory set the switch at 220V side of monitor power supply.
When you need switchover, off is required before it.
As this model is the Frame type, any pressure on the CRT neck shall be avoided.

ADJUSTMENT PROCEDURE

1. Voltage adjustment

(1) +B (110V) Voltage adjustment

Adjust the VR81 (+B-ADJ) so as that the voltage at TP1 (test point of TNP82840) shall be 110V.

(2) Confirming the +B2, −B3, +B4.

2-1 +B2 (+58V)

Confirm the voltage at TP3 (test point of A-P, W, B) is +58 ±2V.

2-2 −B3 (−20V)

Confirm the voltage at TP4 (test point of A-P, W, B) is −20 ±2V.

2-3 +B4 (+20V)

Confirm the voltage at TP5 (test point of A-P, W, B) is +20V ±2V.

2-4 +B5 (+8.5V)

Confirm the voltage at TP6 (test point of F-P, W, B) is +8.5 ±0.5V.

(3) Confirm the Heater voltage

Measure and confirm the voltage at the seveth pin of CRT socket is 6.0 ±0.2Vrms.

Measuring should be done later more than five minutes after power on.

2. CRT Screen adjustment (Adjustment of CRT cut off)

1) Adjust the R,G,B switch of signal generator so as that the CRT screen shows no signal.
2) Turn the sub-brightness VR (R554) to the MIN.
3) Turn the screen VR (R372) to the MIN.
4) Turn all the low light VRs clockwise from the solder view.
5) Insert the service switch of SC401 into "S" side.
6) Turn R554 (sub-brightness VR) so as that the voltage of G1 is −17V.
   Use the probe of 100:1 ratio.
7) Turn the screen VR and find what is the color which is light emitted at the last moment.
8) Turn the low light VRs of each color except that of your finding at item 7 toward darkness to the MAX.
9) Turn the screen VR and set it where the color you found at item 7 can be seen slightly.
10) Turn the low light VRs of other two colors and set them where these two colors can.be seen at the same degree as you adjusted the color at item 9.
11) Insert the service switch of SC401 into "N" side.
12) Adjust R554 (Sub-brightness control volume on Main P.W.A) and set at the point where raster is off.
13) Viewing the oscilloscope, turn the R554 anti-clockwise until the voltage lowers 5V further (CRT 8 pin G1 voltage shows −22V.)

3. White Balance adjustment

1) Set the video gain volume (R.G.B) at the center.
2) Input the white signal of "H".
3) Adjust the video gain volumes (R:R301,G:R311, B:R321) so as that CRT shows white color.
4) After adjusting the white balance, rotate the brightness volume from MAX to MIN and make sure that the white balance is not changed.
   If something is wrong, please adjust the low light volume.

4. Purity adjustment

In case of ITC, this specification is applied only when the problem is found in the execution of "final confirmation method for purity"

1) Make sure that this adjustment should be done later more than 30 minutes after power on.
2) In the no magnetic field, erase the magnetism of chassis and CRT with degaussing coil.
3) Confirm that static convergence is roughly matched.
4) Display Red color solely with the signal generator.
5) Move the D.Y. to rear and adjust the purity magnet so as that the fireball is showed at the center of the screen.
6) After the adjustment of item 5, re-adjust the static convergence if some gap was found.
7) After the item 6, repeat the item 5 again.
8) Display the fireball of G and B. Adjust the purity magnets so as that each fire ball is at the center of the screen simultaneously.
9) Display the red color solely again and move the D.Y. in order to display the red color on the whole screen.
10) Confirm the "no magnetic field", "magnetic field" and "reverse magnetic field" to R.G.B respectively.
11) If there remains magnetism even after the adjustment, put the compensation magnet for purity to make countermeasure.

The final confirmation method for purity

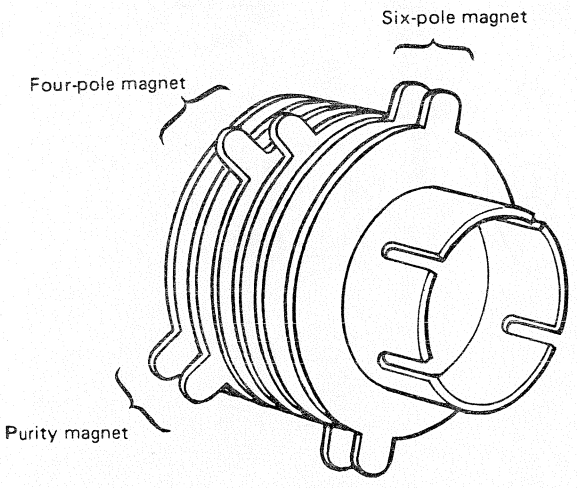
In the natural magnetic field, rotate the set in the direction of East, West, South and North. Field magnetic may causes magnetism on the set. Confirm that the automatic degaussing circuit built in the set can erase the amount of magnetism which was magnetized with above rotation.

5. Convergence adjustment

1) Input the mixed dot pattern of R and B with the signal generator.
2) Match the R and B at screen center with four pole magnet. (Rotate the two ring magnets and R. B move circularly with the other direction respectively.)
3) Input the mixed dot pattern of R.G.B with the signal generator.
4) At the screen center, match R and B to G with the six-pole magnet.
5) Make the fine tuning of D.Y. location so as to get good convergence on the whole screen.
6) If the convergence on the fringe area is bad, put "the magnetic small pieces" at the four corners of D.Y. and fix them the convergence becomes better.

Note: Caution for putting "the magnetic small pieces".
(1) Take more than 20mm distance from anode cap.
(2) Don't put them duplicately.
(3) Don't put it on some other labels.

7) After the convergence adjustment, confirm if purity is OK.
In case purity is no good, back to [4] purity adjustment and re-adjust the purity.
8) Repeat the above procedure in several times and get the best purity and convergence.



Static Magnet

6. H. Hold Adjustment

Adjust R516 (H. Hold).so as that the character area locates at the raster center (Horizontally).

7. V. Hold Adjustment

Turn the R407 (V. Hold) toward lower vertical frequency so as that the picture becomes out of synchronous..

Turn the R407 (V.Hold) toward the opposite direction to the before until the picture becomes synchronized.

8. V. LIN Adjustment

1) Display cross-hatch with the character generator.
2) Adjust R426 (V. Size) for the vertical size to be 180 ±2mm.
Adjust R420 (V. Posi) for cross-hatch to locate at CRT center.
3) Adjust R424 (V. Lin) for the V. LIN to be the best.

9. V. size Adjustment

Adjust R426 (V. size) for the vertical size to be 180 ±2mm.

10. V. POSI Adjustment

Adjust R420 (V. posi) for the character area to locate at the CRT center.

11. H. Width Adjustment

Adjust L555 (H. Width) for H. WIDTH to become 240 ±2mm.

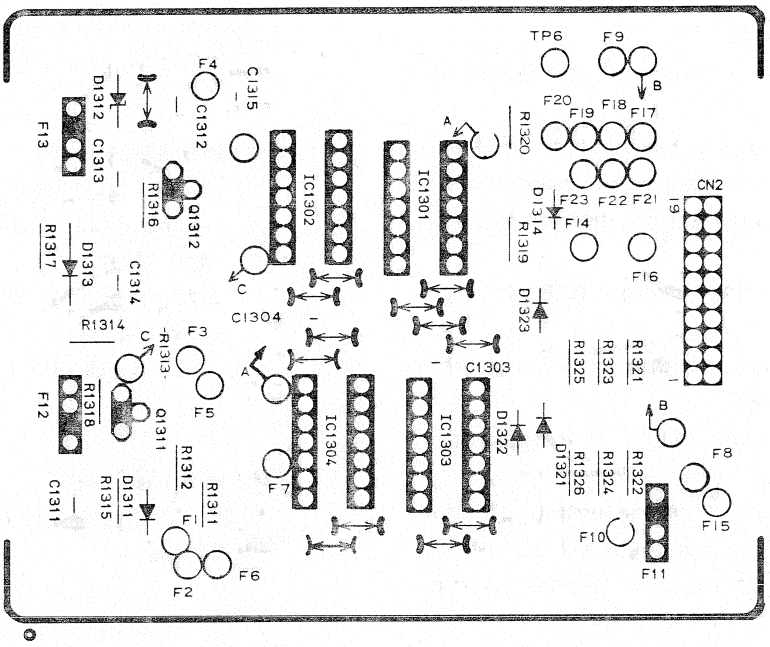
Note: Inserting the L555's core into bobin is the direction of the adjustment.

12. V. PCC (Vertical pin cushion) Adjustment

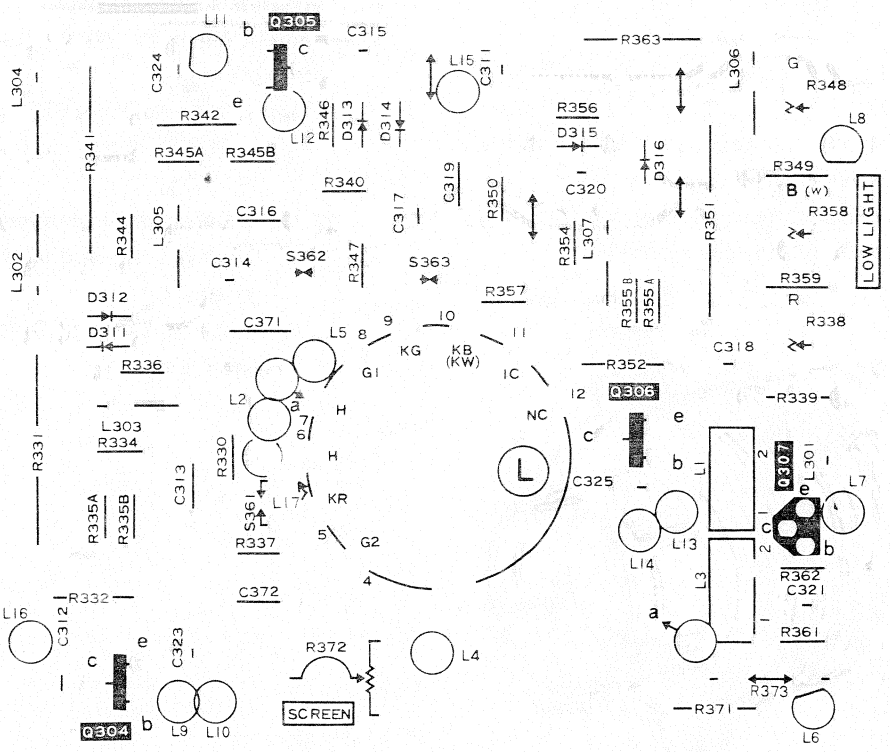
1) Display cross-hatch (Green color) with the signal generator.
2) Adjust R754 (V. PCC) for vertical pin cushion to become minimum.

INTERFACE AND CRT-SOCKET CIRCUIT BOARD SOLDER VIEWS

Interface Board (TNP81121)

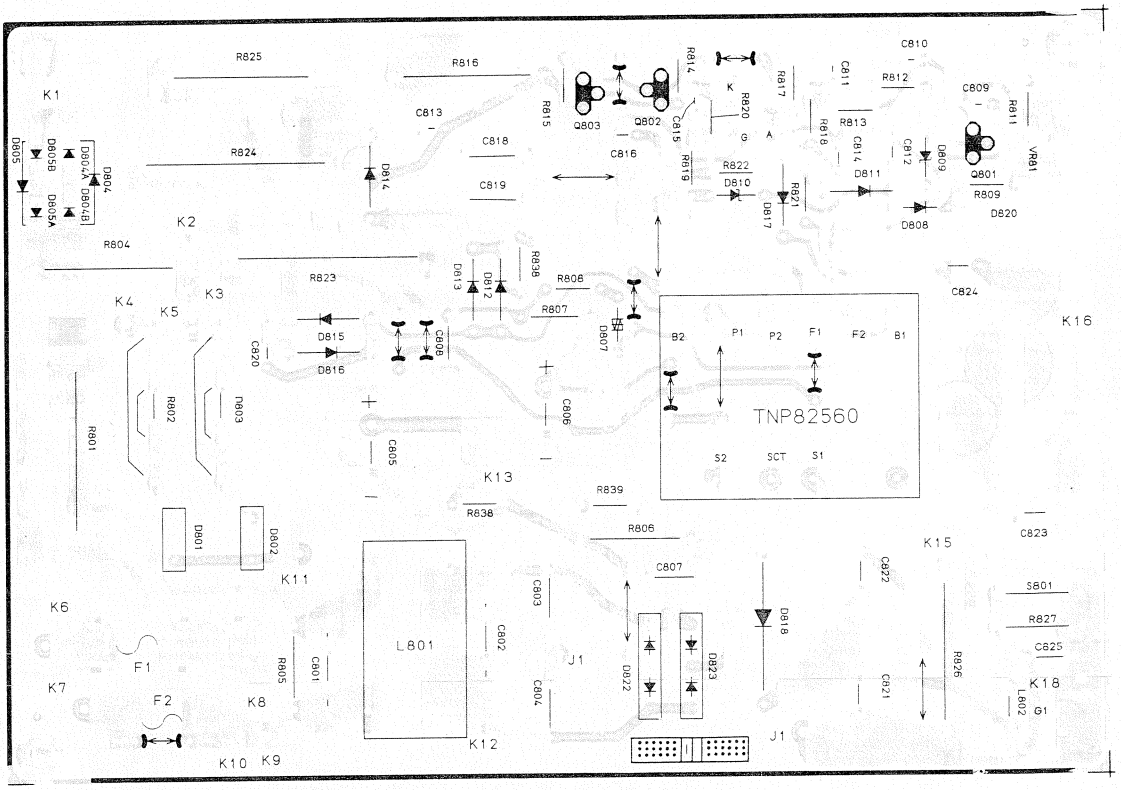


CRT Socket Board (TNP85952)



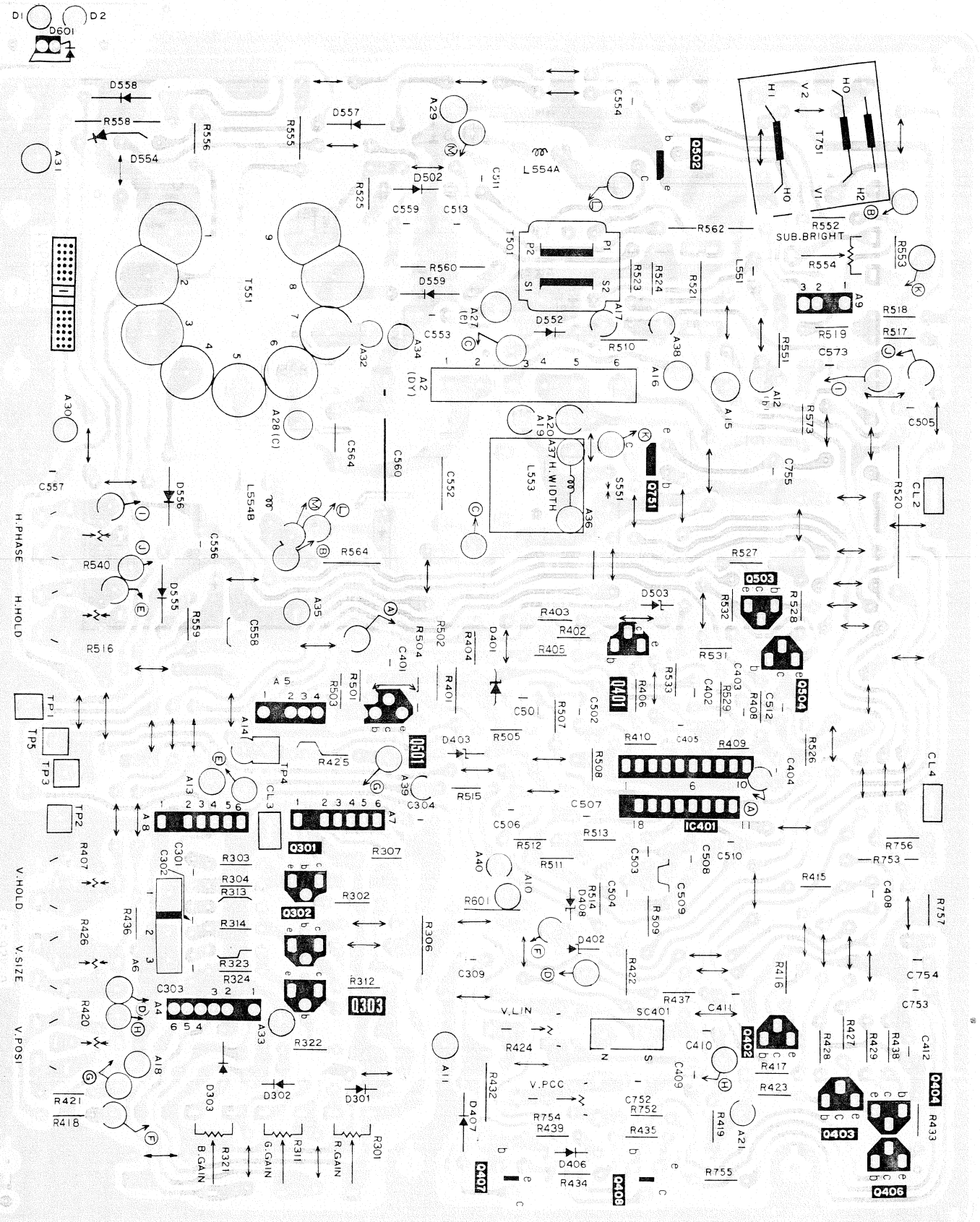
POWER SUPPLY CIRCUIT BOARD-SOLDER VIEW

MONITOR POWER SUPPLY CIRCUIT BOARD-SOLDER VIEW

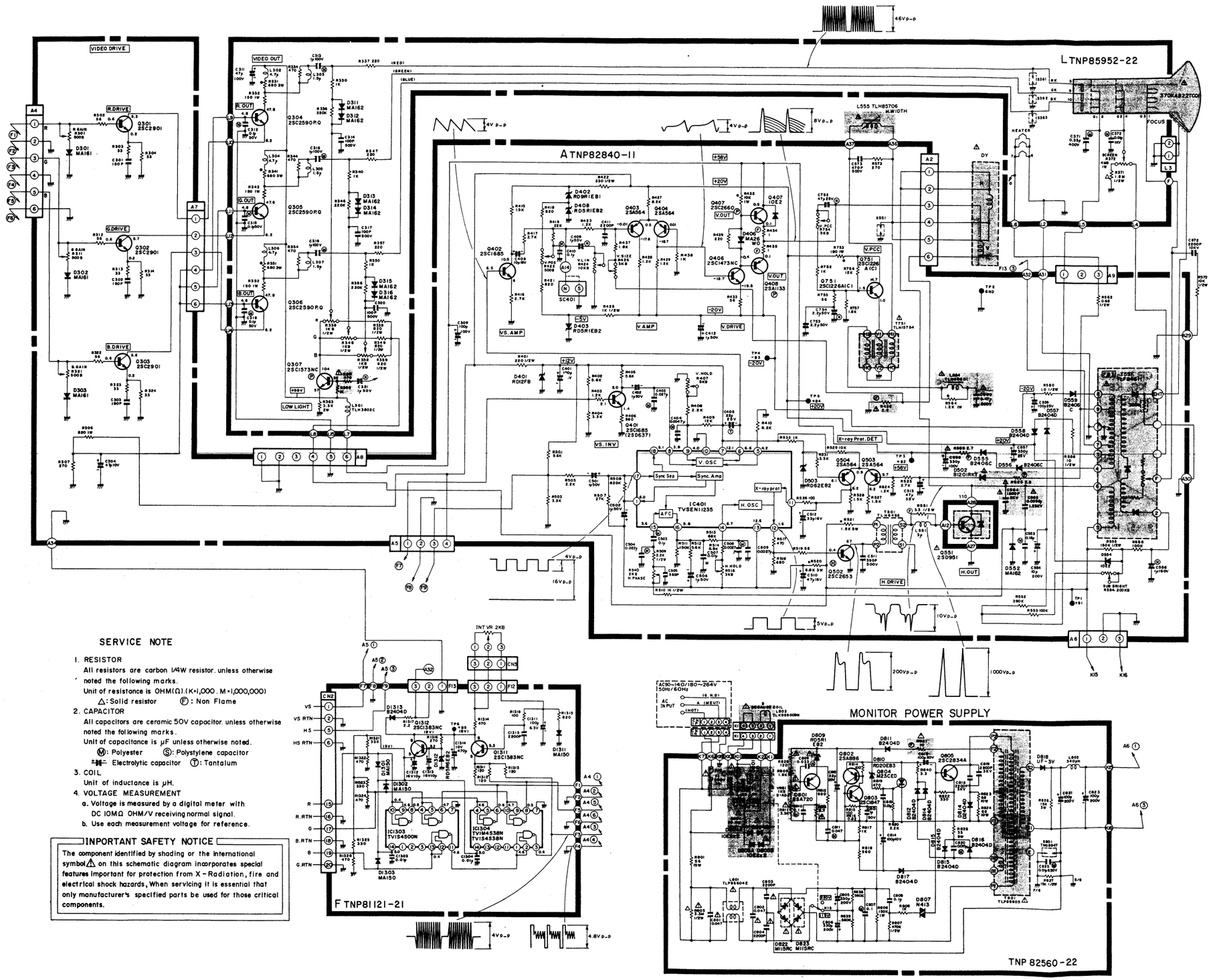


DRIVE CIRCUIT BOARD SOLDER VIEW

Analog Board TNP82840 (Main P.W.A)

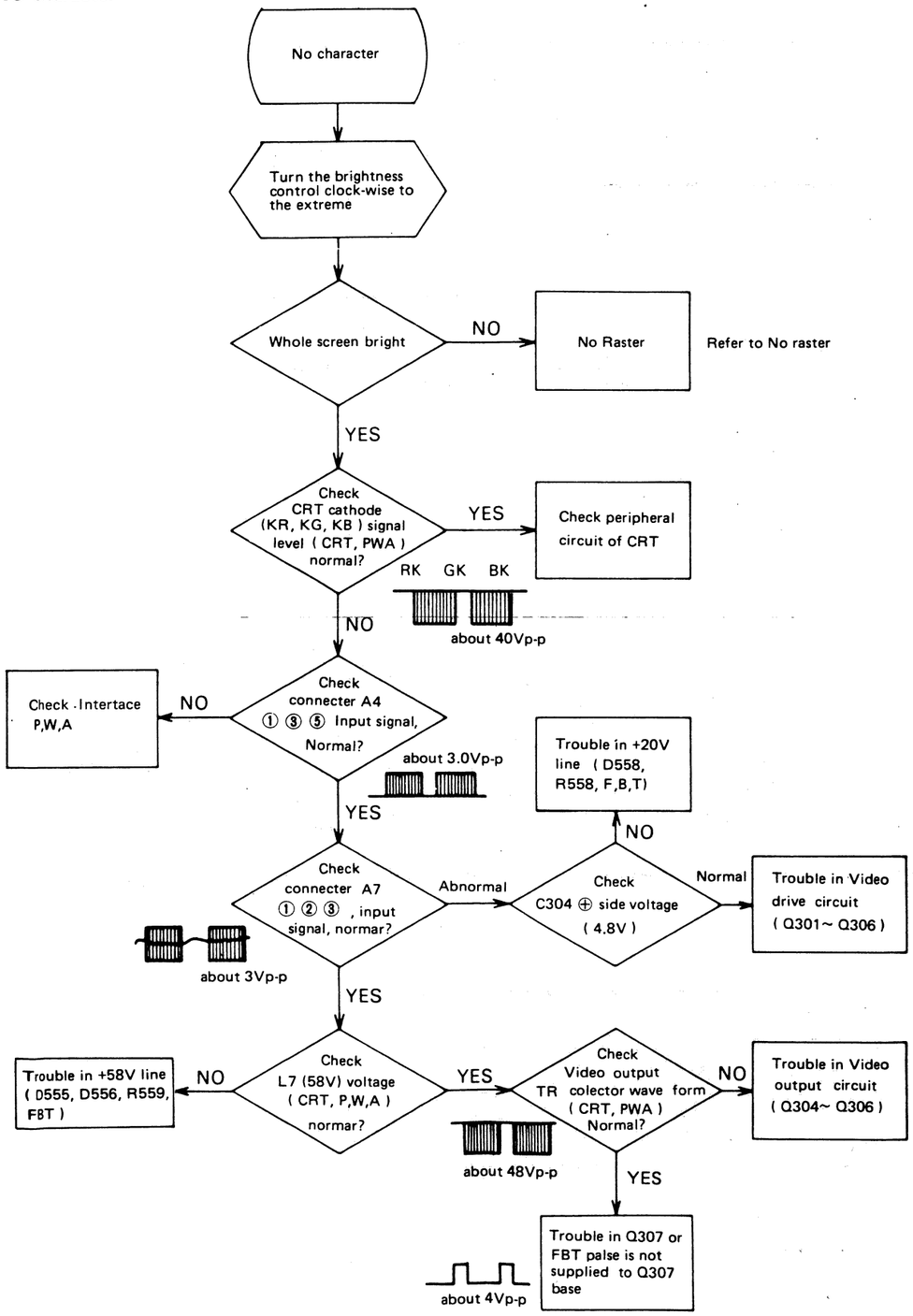


SCHEMATIC DIAGRAM FOR TX-1404FH

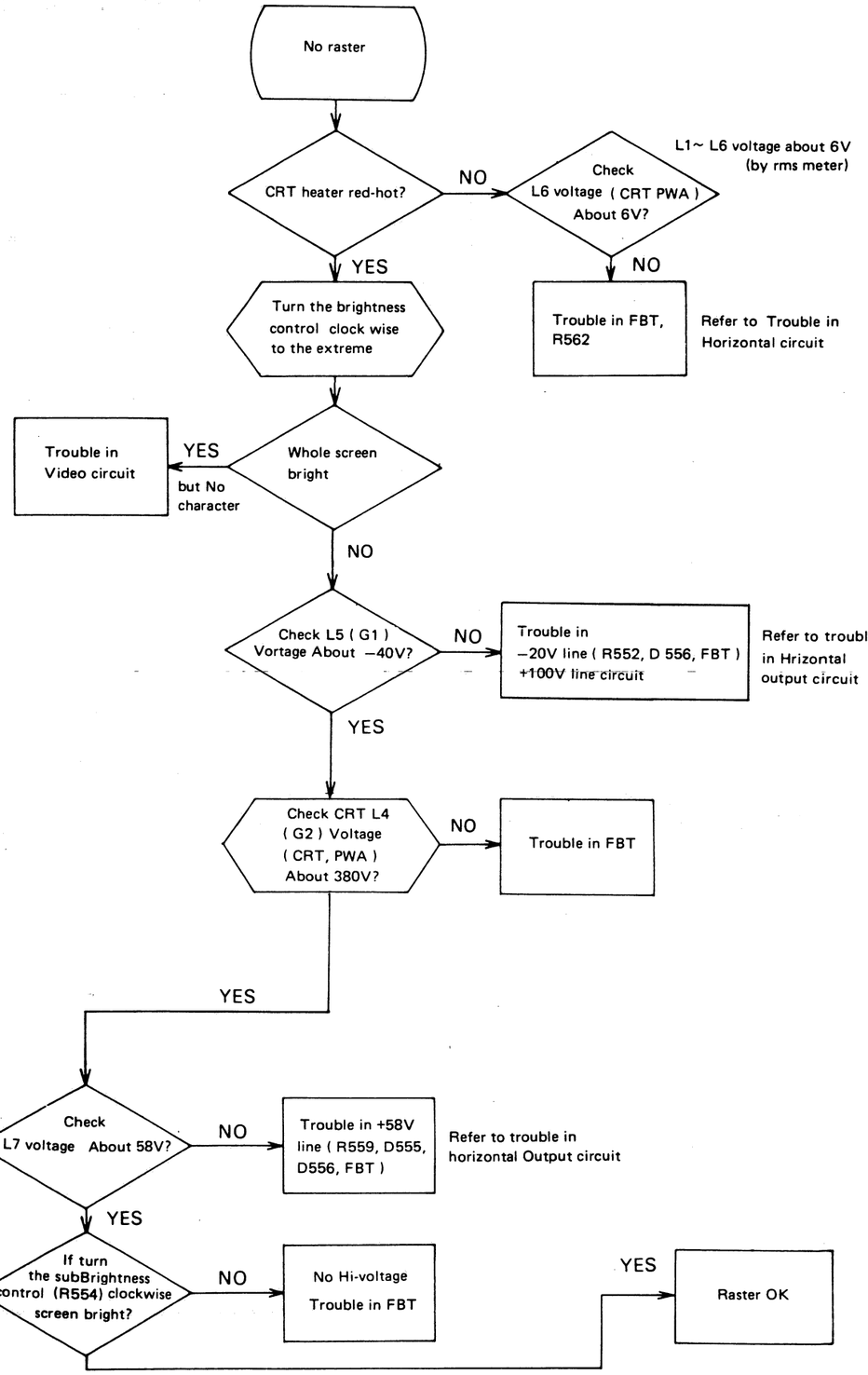


TROUBLE SHOOTING HINTS

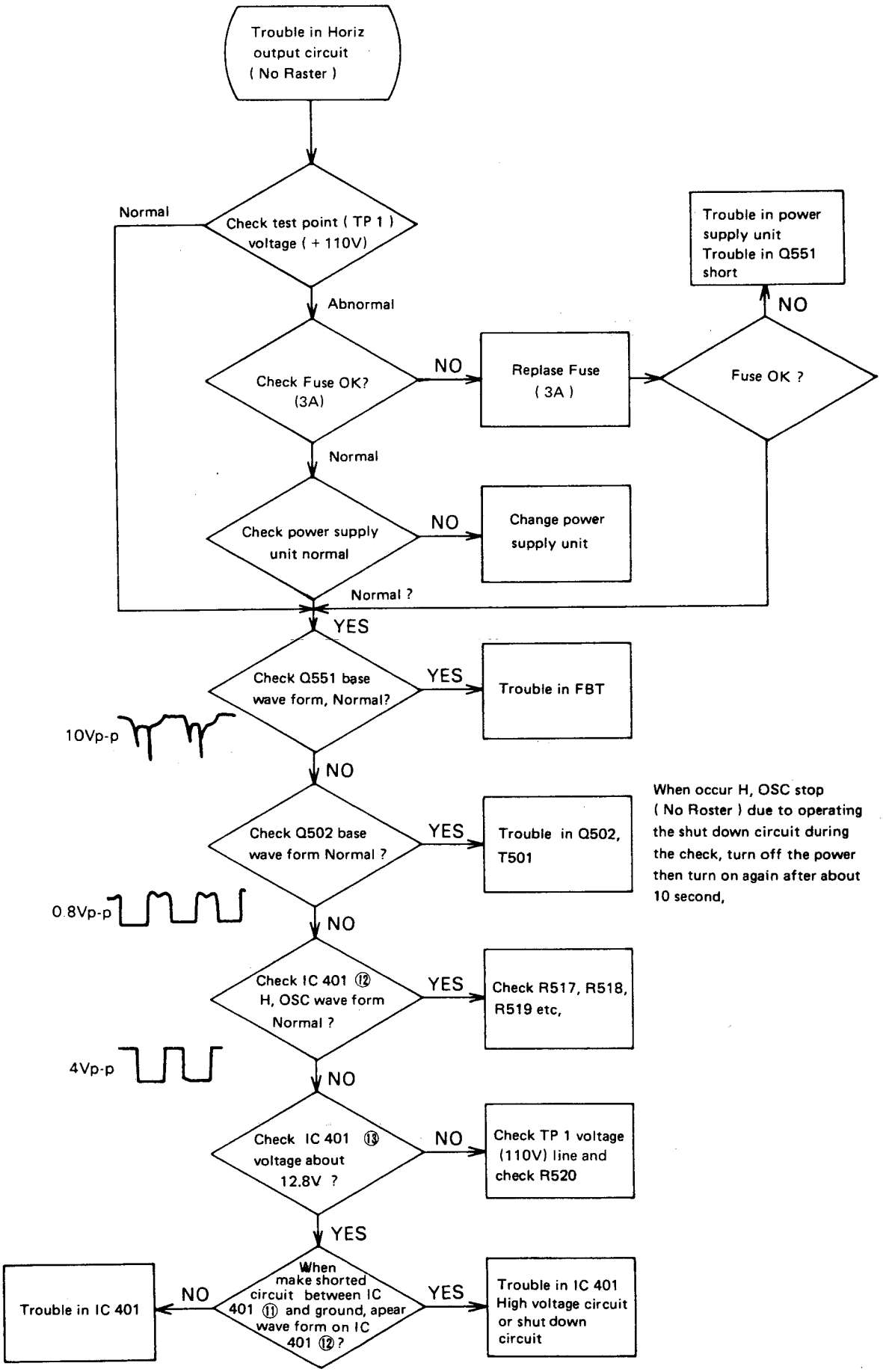
ⓐ NO character



ⓑ No Raster

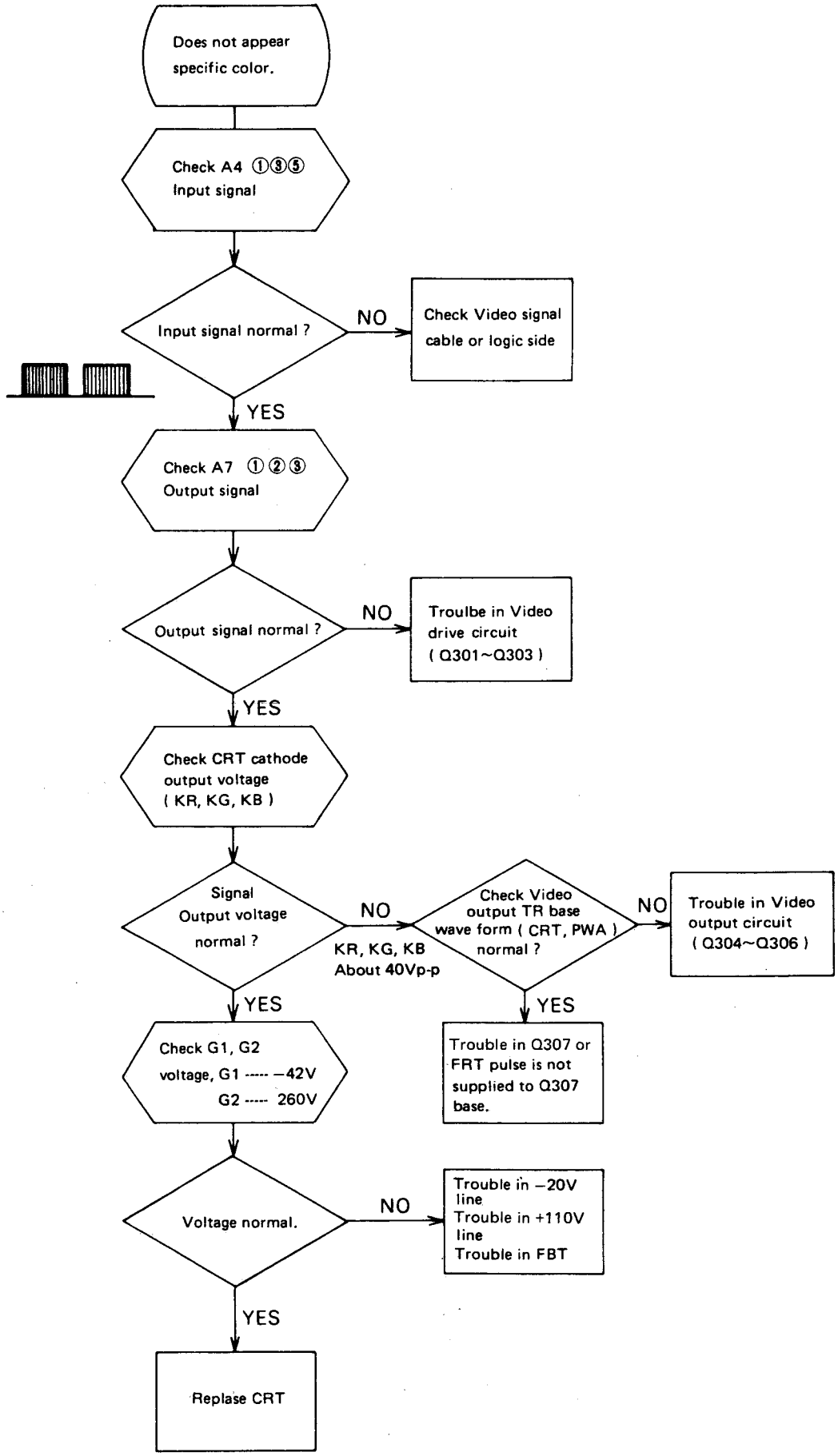


ⓑ-1 Trouble in Horiz Out Circuit

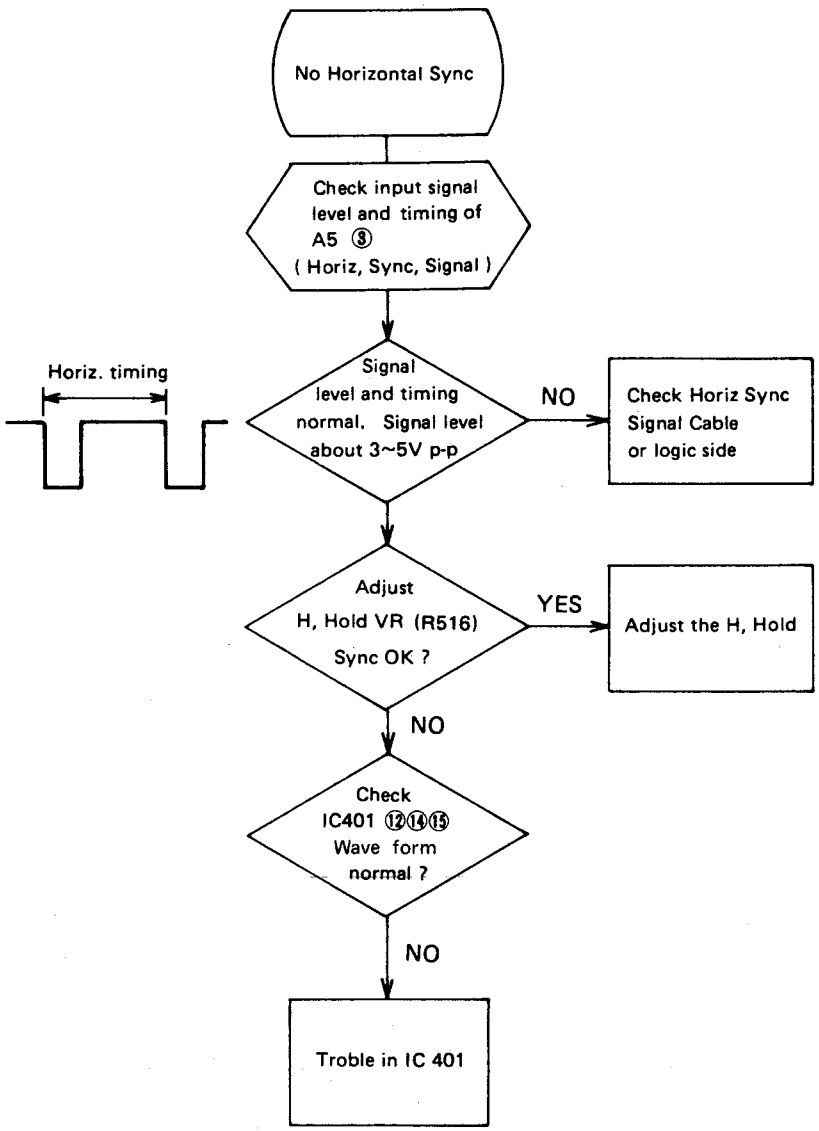


When occur H, OSC stop (No Roster) due to operating the shut down circuit during the check, turn off the power then turn on again after about 10 second,

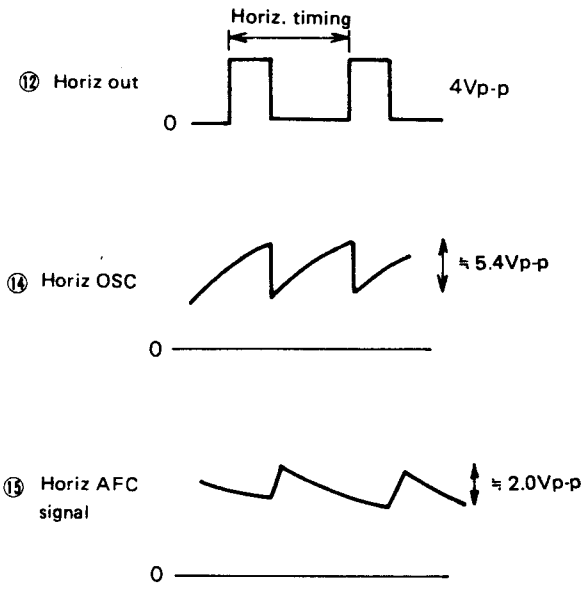
ⓒ Does not appear specific color



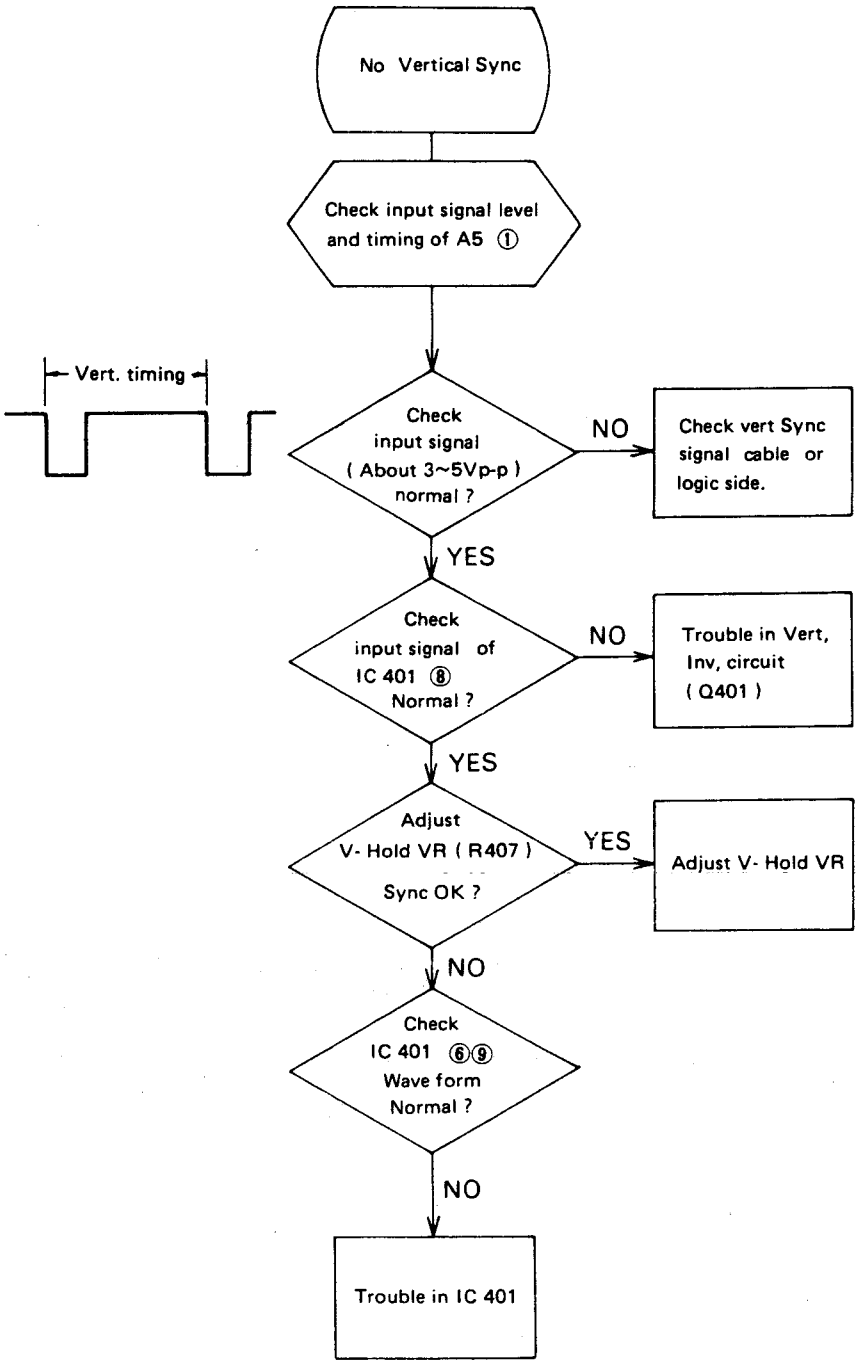
ⓓ NO Horizontal Sync.



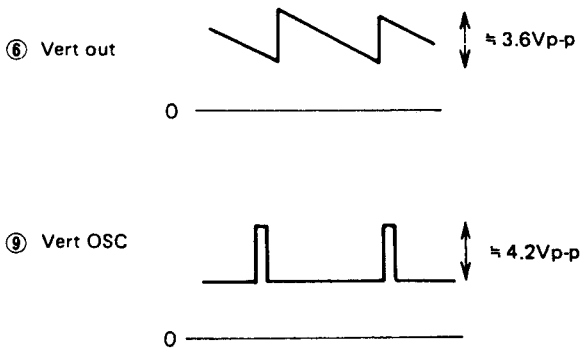
IC401



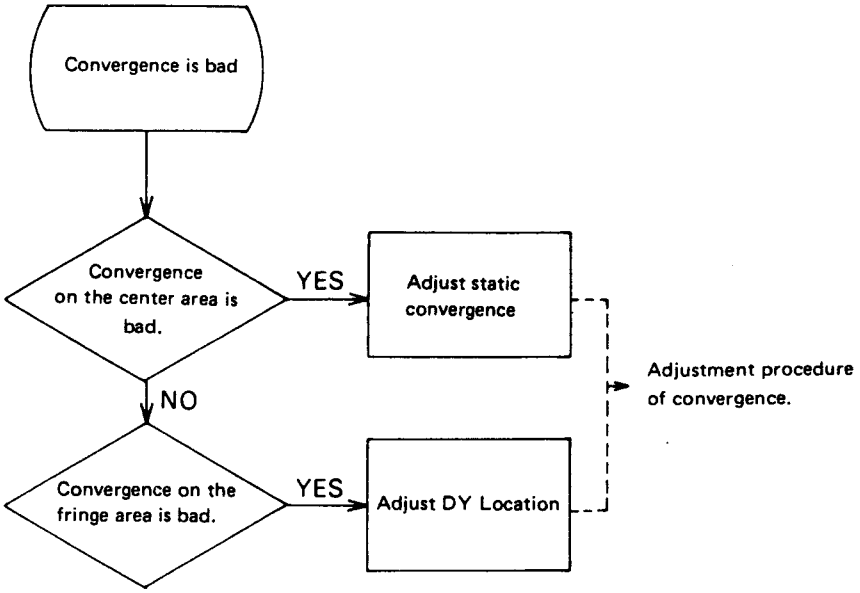
ⓔ NO Vertical Sync.



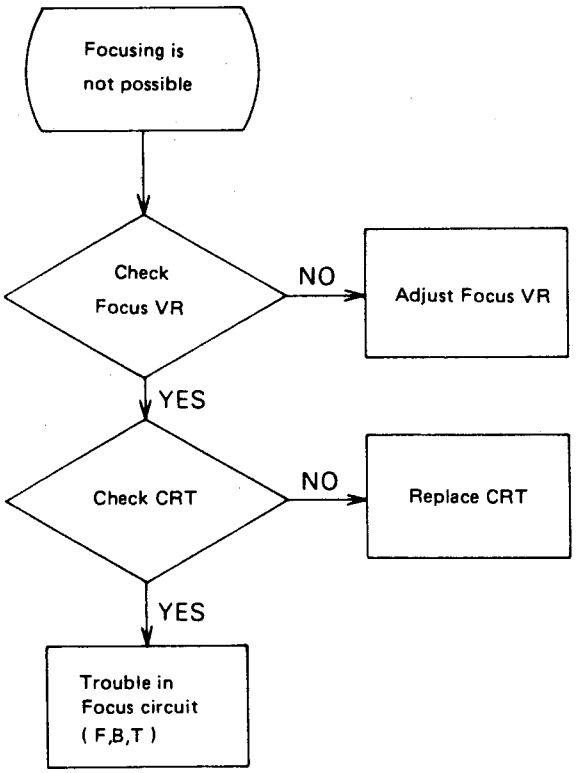
IC401



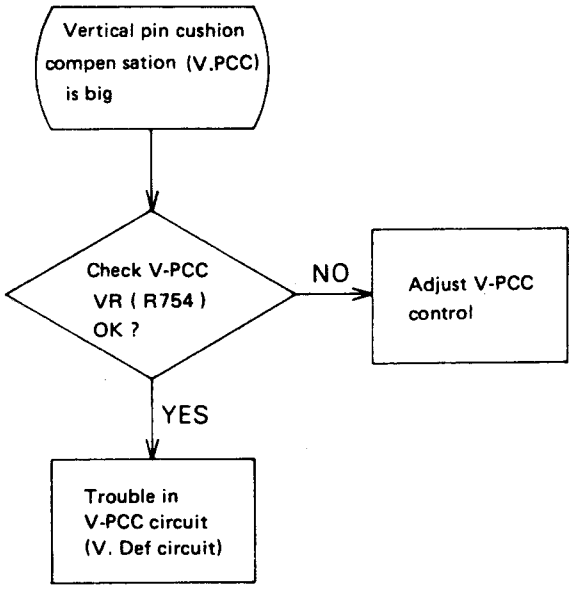
ⓕ Covergence is Bad



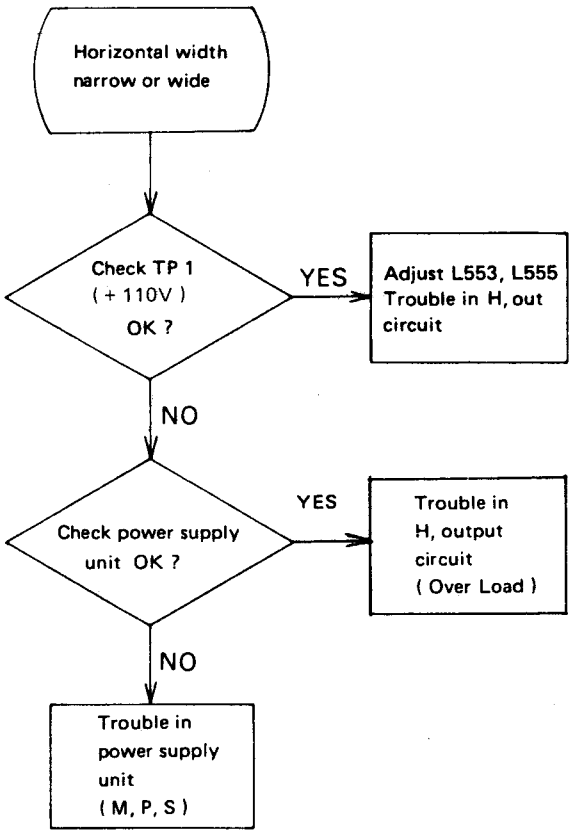
ⓖ Focusing Problem



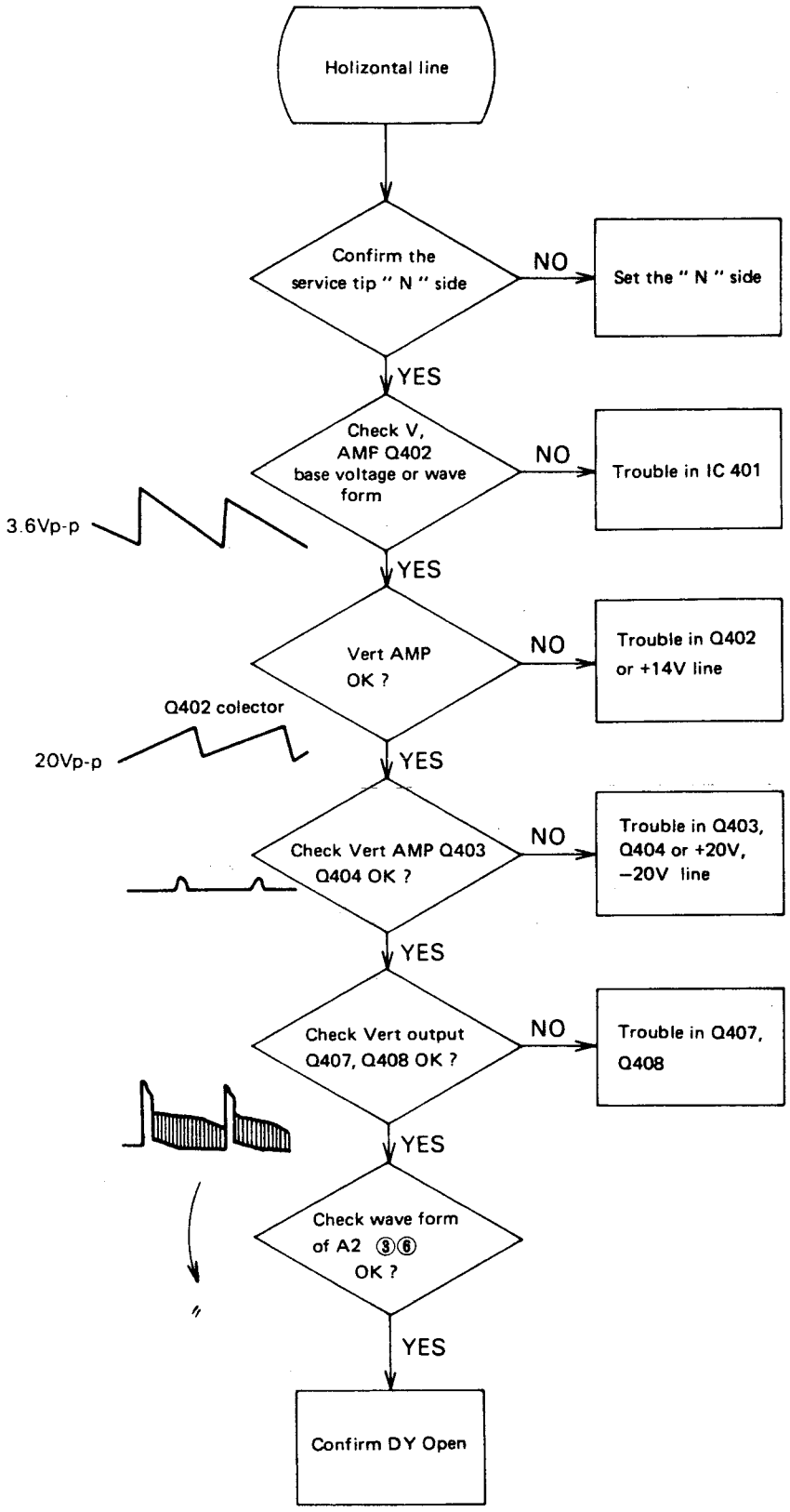
ⓗ Vertical Pin Compensation (V.PCC) is big



ⓘ Horizontal width is Abnormal



ⓙ Horizontal Line



REPLACEMENT PARTS LIST

Important Safety Notice

Components identified by the International symbol ⚠ have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

Note: Tolerance J: ±5% K: ±10% Z: $^{+80}_{-20}$% C: ±0.25pF

Ref. No.		Part No.	Description
CABINET AND MAIN CHASSIS PARTS			
		TUW85903	Side Plate (Riht)
		TUW85904	Side Plate (Left)
		TUX85106	Top Angle
		TUX85819	Side Bracket (Right)
		TUX85820	Side Bracket (Left)
		TUX85821	Bottom Plate
		TUX85109	Bracket
		TUC85907	Power Case
		TUC85908	Power Cover
		TUW85304	Switch Plate
		TNP82840-11	Main P.C. Board Ass'y
		TNP91952-22	CRT P.C. Board Ass'y
		TNP81120-11	Sub P.C. Board Ass'y
		TNP82560-22	Power P.C. Board Ass'y
	⚠	TLK859009N	Degauss Coil
	⚠	370KAB22TC01	Picture Tube
		TUX85205	Connector Bracket
		TUX85112	Power (Block) Bracket
		TBM80845-1	Model (Plate) TX1404FH
		TJB85302-1	Focus Terminal Road
		TKX850301	P.C. Board Holder
		TKX850401	P.C. Board Holder
		TKX850501	P.C. Board Holder Bracket
		TMK84518	CRT Barrier
		TMK13511	TR Barrier
		TMK3410	Maica
		TMK84510	Focus Barrier
		TMK84520	Insulator Sheet
		TMM1459	Clip
		TMM5402-1	Clamper
		TMM15202	CRT Socket Cover
		TMM81452	Insulator
		TES201	Coil Spring
Q551	⚠	2SD951	Transistor
L555	⚠	TLH85706	Coil
C572		ECQW100222K	Polyester
R572		ERD50FJ103	Carbon 10KΩ J ½W
VR305		EVV58AF25B23	Control
		TXAJTA3P478	3P Connector Ass'y
		TXAJTA6P156	6P Connector Ass'y
		TXAJTA3P479	3P Connector Ass'y
		TXAJTA2P015	2P Connector Ass'y
		TPC851432	Outer Carbon TX1404FH
		TXAPD11404ZE	Filler Complete
		TPD359005	Filler
		TPE174005	Set Cover
		TQA811118	Schematic Diagram
		TQF80759	Warning Label
		TQE616	Bag
		XTB4+20BFN	CRT Fixing Screw
		XWA5B	CRT Fixing Spring Washer
		XWG5H17	CRT Fixing Washer

TNP82840-11 MAIN P.C. BOARD

IC & TRANSISOTRS

IC401	TVSEN11235	I.C
Q301	2SC2901	Transistor
Q302	2SC2901	Transistor
Q303	2SC2901	Transistor
Q401	2SC1685	Transistor
Q402	2SC1685	Transistor
Q403	2SA564A	Transistor
Q404	2SA564A	Transistor
Q406	2SC1473QNC	Transistor
Q407	2SC2660LBP	Transistor
Q408	2SA1133LBP	Transistor
Q502	2SC2653HLB	Transistor
Q503	2SA564A	Transistor
Q504	2SA564A	Transistor
Q751	2SC1226AC	Transistor

DIODES

D301	MA161	Diode
D302	MA161	Diode
D303	MA161	Diode
D401	TVSRD12FB	Diode
D402	TVSRD9R1EB1	Diode
D403	TVSRD5R1EB2	Diode
D406	MA26	Diode
D407	TVS10E2	Diode
D408	TVSRD5R1EB2	Diode
D502 ⚠	TVSB1201RKT	Diode
D503	TVSRD6R2EB2	Diode
D552	MA162	Diode
D554	TVS10E2	Diode
D555	TVSB2406C	Diode
D556	TVSB2406C	Diode
D557	TVSB2404D	Diode
D558	TVSB2404D	Diode
D559	TVSB2406C	Diode

COILS & TRANS

L551	TLT030L119C	Peaking Coil
L554 ⚠	TLH85601	Coil
T501	TLH6466	Coil
T551 ⚠	TLF84611	Flyback Trans
T751 ⚠	TLH15754	Coil

CAPACITORS

C301	ECKD1H151KB2	Ceramic	150pF	K	50V
C302	ECKD1H151KB2	Ceramic	150pF	K	50V
C303	ECKD1H151KB2	Ceramic	150pF	K	50V
C304	ECEA1AS470	Electrolytic	47μF		10V

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Ref. No.	Part No.	Description			
C309	ECEA2AS101	Electrolytic	100μF		100V
C401	ECEA1CS101	Electrolytic	100μF		16V
C402	ECEA1HS010	Electrolytic	1μF		50V
C403	ECQM1H273JZ	Polyester	0.027μF	J	50V
C404	ECQM1H472JZ	Polyester	4700pF	J	50V
C405	ECSF25E2R2Y	Tantalume	2.2μF		25V
C408	ECEA1CS100	Electrolytic	10μF		16V
C409	ECEA1HN010S	Electrolytic	1μF		50V
C410	ECQM1H104JZ	Polyester	0.1μF	J	50V
C411	ECQM1H222JZ	Polyester	2200pF	J	50V
C412	ECEA1HS010	Electrolytic	1μF		50V
C501	ECEA1HS010	Electrolytic	1μF		50V
C502	ECEA1HS010	Electrolytic	1μF		50V
C503	ECQM1H104JZ	Polyester	0.1μF	J	50V
C504	ECQM1H223JZ	Polyester	0.022μF	J	50V
C505	ECKD1H561KB	Ceramic	560pF	K	50V
C506	ECEA1HS010	Electrolytic	1μF		50V
C507	ECQM1H103JZ	Polyester	0.01μF	J	50V
C508	ECQM1H272JZ	Polyester	2700pF	J	50V
C509	ECQF6272KZ	Polypropylene	2700pF	K	600V
C510	ECEA1CS470	Electrolytic	47μF		16V
C511	ECKD2H391KB9	Electrolytic	390pF	K	500V
C512	ECEA1CS330	Electrolytic	33μF		16V
C513	ECEA1VS470	Electrolytic	47μF		35V
⚠ C552	ECWH12H562JS	Polypropylene	5600pF	J	12V
C553	ECQM1H184JZ	Polyester	180KΩ	J	50V
C554	ECEA2DS100	Electrolytic	10μF		200V
C556	ECEA160N1	Electrolytic	1μF		160V
C557	ECEA1ES331	Electrolytic	330μF		25V
C558	ECEA2AS331	Electrolytic	330μF		100V
C559	ECEA1ES101	Electrolytic	100μF		25V
C560	ECQF2H474JZ	Polypropylene	0.47μF	J	500V
⚠ C564	ECKD3H122JB2	Ceramic	1200pF	J	
C573	ECKD2H471KB	Ceramic	470pF	K	500V
C752	ECEA1EN470S	Electrolytic	47μF		25V
C753	ECEA1HN2R2S	Electrolytic	2.2μF		50V
C754	ECEA1HN2R2S	Electrolytic	2.2μF		50V

RESISTORS

R301	EVTS3MA00B52	Control	500ΩB		
R302	ERD25FJ560K	Carbon	56Ω	J	¼W
R303	ERD25FJ330K	Carbon	33Ω	J	¼W
R304	ERD25FJ330K	Carbon	33Ω	J	¼W
R306	ERG1ANJ821	Metal Oxide	820Ω	J	¼W
R307	ERD25FJ271K	Carbon	270Ω	J	¼W
R311	EVTS3MA00B52	Control	500ΩB		
R312	ERD25FJ560K	Carbon	36Ω	J	¼W
R313	ERD25FJ330K	Carbon	33Ω	J	¼W
R314	ERD25FJ330K	Carbon	33Ω	J	¼W
R321	EVTS3MA00B52	Control	500ΩB		
R322	ERD25FJ560K	Carbon	56Ω	J	¼W
R323	ERD25FJ330K	Carbon	33Ω	J	¼W
R324	ERD25FJ330K	Carbon	33Ω	J	¼W
R401	ERD50FJ221	Carbon	220Ω	J	½W
R402	ERD25FJ562K	Carbon	5.6KΩ	J	½W
R403	ERD25FJ122K	Carbon	1.2KΩ	J	½W
R404	ERD25FJ332K	Carbon	3.3KΩ	J	½W
R405	ERD25FJ562K	Carbon	5.6KΩ	J	½W
R406	ERD25FJ561K	Carbon	560Ω	J	½W
R407	EVTV0UA00B53	Control	5KΩB	J	½W
R408	ERD25FJ222K	Carbon	2.2KΩ	J	¼W
R409	ERD25FJ123K	Carbon	12KΩ	J	¼W
R410	ERD25FJ822K	Carbon	8.2KΩ	J	¼W
R415	ERD25FJ152K	Carbon	1.5KΩ	J	¼W
R416	ERD25FJ272K	Carbon	2.7KΩ	J	¼W
R417	ERD25FJ272K	Carbon	2.7KΩ	J	¼W
R418	ERD25FJ821K	Carbon	820Ω	J	¼W
R419	ERD25FJ223K	Carbon	22KΩ	J	¼W
R420	EVTV0UA00B52	Control	500Ω	J	¼W
R421	ERD25FJ821K	Carbon	820Ω	J	¼W
R422	ERD50FJ331	Carbon	330Ω	J	½W
R423	ERD25FJ122K	Carbon	1.2KΩ	J	¼W
R424	EVTS3MA00B14	Control	10KΩB		
R425	ERD50FJ102	Carbon	1KΩ	J	½W
R426	EVTS3MA00B23	Control	2KΩB		
R427	ERD25FJ822K	Carbon	8.2KΩ	J	¼W
R428	ERD25FJ122K	Carbon	1.2KΩ	J	¼W
R429	ERD25FJ122K	Carbon	1.2KΩ	J	¼W
R432	ERG1ANJ103	Metal Oxide	10KΩ	J	1W
R433	ERD25FJ560K	Carbon	56Ω	J	¼W
R434	ERD25FJ1R0K	Carbon	1Ω	J	¼W
R435	ERD25FJ1R0K	Carbon	1Ω	J	¼W
R436	ERD25FJ2R2K	Carbon	2.2Ω	J	¼W
R437	ERD25FJ122K	Carbon	1.2KΩ	J	¼W
R438	ERD25FJ102K	Carbon	1KΩ	J	¼W
R439	ERD25FJ221K	Carbon	220Ω	J	¼W
R501	ERD25FJ562K	Carbon	5.6KΩ	J	¼W
R502	ERD25FJ332K	Carbon	3.3KΩ	J	¼W
R503	ERD25FJ332K	Carbon	3.3KΩ	J	¼W
R505	ERD25FJ222K	Carbon	2.2KΩ	J	¼W
R507	ERD25FJ273K	Carbon	27KΩ	J	¼W
R508	ERD25FJ824K	Carbon	820KΩ	J	¼W
R509	ERD50FJ222	Carbon	2.2KΩ	J	½W
R510	ERD50FJ102	Carbon	1KΩ	J	½W
R511	ERD25FJ154K	Carbon	150KΩ	J	¼W
R512	ERD25FJ562K	Carbon	5.6KΩ	J	¼W
R513	ERD25FJ683K	Carbon	68KΩ	J	¼W
R514	ERD25FJ682K	Carbon	6.8KΩ	J	¼W
R516	EVTS3MA00B33	Control	3KΩ		
R517	ERD25FJ471K	Carbon	470Ω	J	¼W
R518	ERD25FJ681K	Carbon	680Ω	J	¼W
R519	ERD25FJ560K	Carbon	56Ω	J	¼W
R520	ERG3ANJ682	Metal Oxide	6.8KΩ	J	3W
R521	ERG5ZJ182	Metal Oxide	1.8KΩ	J	5W
R523	ERD25FJ272K	Carbon	2.7KΩ	J	¼W
R524	ERD25FJ122K	Carbon	1.2KΩ	J	¼W
⚠ R525	ERD25FJ2R2K	Carbon	2.2Ω	J	¼W
R526	ERD25FJ101K	Carbon	100Ω	J	¼W
R527	ERD25FJ152K	Carbon	1.5KΩ	J	¼W
R528	ERD25FJ152K	Carbon	1.5KΩ	J	¼W

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Ref.No.	Part No.	Description			
R529	ERD25FJ103K	Carbon	10KΩ	J	¼W
R531	ERD25FJ332K	Carbon	3.3KΩ	J	¼W
R533	ERD25FJ102KK	Carbon	1KΩ	J	¼W
R540	EVTS3MA00B23	Control	2KΩB		
R551	ERD50FJ3R3	Carbon	3.3Ω	J	½W
R552	ERD25FJ394K	Carbon	390KΩ	J	¼W
R553	ERD25FJ104K	Carbon	100KΩ	J	¼W
R554	EVTS3MA00B25	Control	2MΩB		
R555	ERD50FJ154	Carbon	150KΩ	J	½W
R556	ERD25FJ104K	Carbon	100KΩ	J	¼W
R558	ERQ12HJ1R0	Fuseble	1Ω	J	12W
R559	ERD25FJ2R7K	Carbon	2.7Ω	J	¼W
R560	ERQ12HJ1R0	Fuseble	1Ω	J	12W
R562	ERQ12HKR33	Fuseble	0.33Ω	K	12W
R564	ERG1ANJ122	Metal Oxide	1.2KΩ	J	1W
R573	ERD25FJ271K	Carbon	270Ω	J	¼W
R572	ERD25FJ102K	Carbon	1KΩ	J	¼W
R753	ERG1ANJ181	Metal Oxide	180Ω	J	1W
R754	EVTS3MA00B53	Control	5KΩB		
R755	ERD25FJ560K	Carbon	56Ω	J	¼W
R756	ERD25FJ123K	Carbon	12KΩ	J	¼W
R757	ERD25FJ182K	Carbon	1.8KΩ	J	¼W

OTHER PARTS

S551	TGPS152GL	Spark Gap
A4	TJS868280	6P Housing Socket
A5	TJS868260	4P Housing Socket
A7	TJS868280	6P Housing Socket
A8	TJS868280	6P Housing Socket
A9	TJS868250	3P Housing Socket
	TXAJTA1P076A	1P Connector Ass'y
	TXAJTC3P504	3P Connector Ass'y
	TMM85501	Rubber
	TUX85810-1	Flyback Bracket
	TES6162	Tr. Spring
	TMK81423	Mica Sheft

TNP82560-22 POWER P.C. BOARD

TRANSISTORS

Q801	2SA720	Transistor (R.S)
Q802	2SA886QBF	Diode (R)
Q803	2SC1847QBF	Diode (R)
Q804	M23CED	Transistor (IFD)
Q805	2SC2834A	Transistor

DIODES

D801 ⚠	ERPF6B0M100F	Posistor			
D802 ⚠	ERPF5B0M120G	Posistor			
D803 ⚠	ERPF5B0M120G	Posistor			
D804A ⚠	TVS10E2	Diode			
D804B ⚠	TVS10E2	Diode			
D805A ⚠	TVS10E2	Diode			
D805B ⚠	TVS10E2	Diode			
D807	TVSN413M	Diode			
D808	ERD25FJ121K	Carbon	120Ω	J	¼W
D809 ⚠	TVSRDSR1EB2	Diode			
D810	TVSRD20EB3	Diode			
D811	TVSB2404D	Diode			
D812	TVSB2404D	Diode			
D813	TVSB2404D	Diode			
D814	TVSB2404D	Diode			
D815	TVSB2404D	Diode			
D816	TVSB2404D	Diode			
D817	TVSB2404D	Diode			
D818	TVSUF-3VT	Diode			
D822 ⚠	TVSMI-15R	Diode			
D823 ⚠	TVSMI-15S	Diode			
L801 ⚠	TLP85604E	Trans			
L802	TLT341-119C	Peaking Coil			
T801 ⚠	TLP85905-1	Trans			

CAPACITORS

C801	ECQU1A473ME	Polypropylene	0.047μF		
C802 ⚠	ECQU1A473ME	Polypropylene	0.047μF		
C803 ⚠	ECKDEL222ZE	Ceramic	2200pF		
C804 ⚠	ECKDEL222ZE	Ceramic	2200pF		
C805	ECES2DV331S	Electrolytic			
C806	ECES2DV331S	Electrolytic	330μF		
C807	ECQE4104KZ	Polyester	0.1μF	K	400V
C808	ECQE4104KZ	Polyester	0.1μF	J	400V
C809	ECQM1H333JZ	Polyester	0.033μF		50V
C810	ECQM1H104JZ	Polyester	0.1μF		
C811	ECQM1H473JZ	Polyester	0.047μF		
C812	ECEA25Z22E	Electrolytic	22μF		25V
C813	ECQV05105JZ	Ceramic			
C814	ECEA1AS101	Electrolytic	100μF		10V
C815	ECQM1H103JZ	Polyester	0.01μF	J	50V
C816	ECEA1HS101	Electrolytic	100μF		50V
C818	ECKD3F222KBN	Ceramic	2200pF	K	
C819	ECKD3F222KBN	Ceramic	2200pF	K	
C820	ECQM1H154JZ	Electrolytic	100μF		200V
C821	ECEA2DS101	Electrolytic	100μF		200V
C823	ECEA2DS101	Electrolytic	100μF		200V
C825	ECQE6103KZ	Polyester	0.01μF	K	600V

RESISTORS

R801 ⚠	ERF15ZXK5R6	Non Flame	2.7Ω	K	5W
R804 ⚠	ERF5AJ680	Non Flame	68Ω	J	5W
R805 ⚠	ERC12ZGK335	Carbon	100KΩ	K	¼W
R806	ERC1GK154	Solid	150KΩ	J	1W
R807	ERD50FJ474	Carbon	470KΩ	J	½W
R808	ERD25FJ102K	Carbon	1KΩ	J	¼W
R809 ⚠	ERD25FJ182K	Carbon	1.8KΩ	J	¼W
R811 ⚠	ERD25FJ332K	Carbon	680Ω	J	¼W
R812	ERD25FJ681K	Carbon	680Ω	J	¼W
R813 ⚠	ERD25FJ2R7K	Carbon	0.82Ω	J	¼W
R814	ERD25FJ101K	Carbon	100Ω	J	¼W
R815	ERD25FJ101K	Carbon	100Ω	J	¼W
R816	ERF3AKR82	Non Flame	0.82Ω	K	3W
R817	ERD25FJ102K	Carbon	1KΩ	J	¼W
R818	ERD25FJ561K	Carbon	560Ω	J	¼W

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Ref.No.	Part No.	Description			
R819	ERD25FJ471K	Carbon	470Ω	J	¼W
R820	ERD25FJ222K	Carbon	2.2KΩ	J	¼W
R821 ⚠	ERD25FJ100K	Carbon	10Ω	J	¼W
R822	ERD25FJ331K	Carbon	330Ω	J	¼W
R823	ERF10ZJ680	Non Flame	68Ω	J	10W
R824	ERF10ZJ680	Non Flame	68Ω	J	10W
R825	ERF5AJ330	Non Flame	33Ω	J	5W
R826	ERG3ANJ153	Metal	15KΩ	J	3W
R827	ERC12GJ153	Solid	15KΩ	J	½W
R838	ERD25FJ564K	Carbon	560KΩ	J	¼W
R839	ERD25FJ564K	Carbon	568KΩ	J	¼W

CONTROL

VR81 ⚠	EVTV0UA00B13	Control

OTHER PARTS

	TES6162	Spring
	TMK81423	Maica Seeft
F1,3	TJC305-1	Fuse Holder
G1	TJC6137	Gnd Terminal
	TXAJTA4P246A	4P Connector Ass'y
	TXAJTV3P527	3P Connector Ass'y
	TXAJTX4P247	4P Connector Ass'y
⚠	XBA2F30NU100	Fuse 3A
S801	TNQ8947	Arester
	ESD391	Switch

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TRANSISTORS & DIODE

Q304	2SC2590Q	Transistor (P, Q)
Q305	2SC2590Q	Transistor (P, Q)
Q306	2SC2590Q	Transistor (P, Q)
Q307	2SC1573QNC	Transistor
D311~316	MA162	Diode

COILS

L301	TLH3802C	Coil		
L302	TLU4R7K106C	Peaking Coil		
L303	TLU1R5K106C	Peaking Coil	1.5μH	K
L304	TLU4R7K106C	Peaking Coil	4.7μH	K
L305	TLU1R5K106C	Peaking Coil	1.5μH	K
L306	TLU4R7K106C	Peaking Coil	4.7μH	K
L307	TLU1R5K106C	Peaking Coil	1.5μH	K

CAPACITORS

C311	ECEA2AS470	Electrolytic	47μF		100V
C312	ECQM1H104JZ	Polyester	0.1μF	J	50V
C313	ECQE1105KZ	Polyester	1μF	K	100V
C314	ECKD2H101KB2	Ceramic	100pF	K	500V
C315	ECQM1H104JZ	Polyester	0.1μF	J	50V
C316	ECQE1105KZ	Polyester	1μF	K	100V
C317	ECKD2H101KB2	Ceramic	100pF	K	500V
C318	ECQM1H104JZ	Polyester	0.1μF	J	50V
C319	ECQE1105KZ	Polyester	1μF	K	100V
C320	ECKD2H101KB2	Ceramic	100pF	K	500V
C321	ECEA1HN010S	Electrolytic	1μF		50V
C371	ECQE4334KZ	Polyester	0.33μF	K	400V
C372	ECQE10103KZ	Polyester	0.01μF	K	1KV

RESISTORS

R330	ERD25FJ102K	Carbon	1KΩ	K	¼W
R331	ERG3ANJ681	Metal Oxide	680Ω	J	3W
R332	ERG1ANJ151	Metal	150Ω	J	1W
R334	ERD25FJ471K	Carbon	470Ω	J	¼W
R336	ERD25FJ224K	Carbon	220KΩ	J	¼W
R337	ERD25FJ221K	Carbon	220Ω	J	¼W
R338	EVMH0GA00B13	Control	1KΩ		
R339	ERD50FJ821	Carbon	820Ω	J	½W
R340	ERD25FJ102K	Carbon	1KΩ	J	¼W
R341	ERG3ANJ681	Metal Oxide	680Ω	J	3W
R372	ERG1ANJ151	Metal	150Ω	J	1W
R344	ERD25FJ471K	Carbon	470Ω	J	¼W
R346	ERD25FJ224K	Carbon	220KΩ	J	¼W
R347	ERD25FJ221K	Carbon	220Ω	J	¼W
R348	EVMH0GA00B13	Control	1KΩ		
R349	ERD50FJ821	Carbon	820Ω	J	½W
R350	ERD25FJ102K	Carbon	1KΩ	J	¼W
R351	ERG3ANJ681	Metal Oxide	680Ω	J	3W
R352	ERG1ANJ151	Metal	150Ω	J	1W
R354	ERD25FJ471K	Carbon	470Ω	J	¼W
R356	ERD25FJ224K	Carbon	220KΩ	J	¼W
R357	ERD25FJ221K	Carbon	220Ω	J	¼W
R358	EVMH0GA00B13	Control	1KΩ		
R359	ERD50FJ821	Carbon	820Ω	J	½W
R361 ⚠	ERD25FJ471K	Carbon	470Ω	J	¼W
R362	ERD25FJ102K	Carbon	1KΩ	J	¼W
R363	ERG2ANJ332	Metal Oxide	3.3KΩ	J	2W
R342	ERG1ANJ151	Metal Oxide	150Ω	J	1W
R371	ERC12GJ185	Solid	1.8MΩ	J	2W
R372	EVME6U10KB46	Control			

OTHER PARTS

S361	TGPS152GL	Spark Gap
S362	TGPS152GL	Spark Gap
S363	TGPS152GL	Spark Gap
	TJS35030	CRT Socket
	TXAJTCBP453	3P Connector Ass'y
	TXAJTC6P187R	6P Connector Ass'y
	TSC8906-0	6P Connector Ass'y

TNP81120-11 SUB P.C. BOARD

I.C & TRANSISTOR & DIODE

IC1301	MB74S00	I.C
IC1302	MB74S38	I.C
Q1311	2SC1383QNC	Transistor
Q1312	2SC1383QNC	Transistor
D1311	MA150	Diode
D1312	TVSRD5R6EB2	Diode
D1313	TVSB2404D	Diode
D1301	MA150	Diode
D1302	MA150	Diode

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Ref.No.	Part No.	Description			
D1303	MA150	Diode			
		CAPACITORS			
C1301	ECKD1H103PF2	Ceramic	0.01μF	P	50V
C1302	ECKD1H103PF2	Ceramic	0.01μF	P	50V
C1311	ECEA0JS101	Electrolytic	100μF		6.3V
C1312	ECEA1CS100	Electrolytic	10μF		16V
C1313	ECEA1CS100	Electrolytic	10μF		16V
C1314	ECEA1AS471	Electrolytic	470μF		10V
		RESISTORS			
R1301	ERD25FJ331K	Carbon	330Ω	J	¼W
R1302	ERD25FJ471K	Carbon	470Ω	J	¼W
R1303	ERD25FJ331K	Carbon	330Ω	J	¼W
R1304	ERD25FJ471K	Carbon	470Ω	J	¼W
R1305	ERD25FJ331K	Carbon	330Ω	J	¼W
R1306	ERD25FJ471K	Carbon	470Ω	J	¼W
R1311	ERD25FJ121K	Carbon	120Ω	J	¼W
R1312	ERD25FJ121K	Carbon	120Ω	J	¼W
R1313	ERD25FJ121K	Carbon	120Ω	J	¼W
R1314	ERD25FJ471K	Carbon	470Ω	J	¼W
R1315	ERD25FJ821K	Carbon	820Ω	J	¼W
R1316	ERD25FJ271K	Carbon	270Ω	J	¼W
R1317	ERD25FJ2R2K	Carbon	2.2Ω	J	¼W
R1318	ERD25FJ101K	Carbon	100Ω	J	¼W
		OTHER PARTS			
CN2	TJS828370	20P Socket			
F12	TJS868250	Socket			
F13	TJS868250	Socket			
	TXAJTC4P234	4P Connector Ass'y			
	TXAJTC6P174	6P Connector Ass'y			

Ref.No.	Part No.	Description

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